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MIDDLE SOUTH UTILITIES SYSTEM

March 5, 1984

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3-A19.09.09.03
3-A19.09.10

Director of Nuclear Reactor Regulation
Attention: Mr. G. W. Knighton
Licensing Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Waterford SES Unit 3
Docket No. 50-382
Procedures Generation Package
Plant Specific Technical Guidelines

REFERENCE: W3P83-4103 dated December 19, 1983

Dear Sir:

By the referenced letter LP&L submitted the Procedures Generation Package for Waterford 3, with the exception of a portion of the plant specific technical guidelines. Save for the functional recovery technical guideline, we are enclosing the remainder of the plant specific technical guidelines required by NUREG-0737, Supplement 1.

It should be noted that the technical guideline for the Degraded Electrical Distribution Emergency Operating Procedure includes guidance on Station Blackout conditions. It is our understanding that this guideline will not be reviewed by your staff at this time. Rather, it will be considered as a response to Generic Letter 81-04 subject to review following resolution of USI A-44, Station Blackout.

Yours very truly,

K W Cook

K. W. Cook
Nuclear Support & Licensing Manager

A003 1/3 Limited Dist

KWC/MJM/ch
Enclosures

cc: W. M. Stevenson, E. L. Blake, J. Wilson, M. Goodman, G.L. Constable

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LOUISIANA POWER & LIGHT

WATERFORD-3 SES

PROCEDURES GENERATION PACKAGE: VOLUME 3

TECHNICAL GUIDELINE

Section 5.6:

Degraded Electrical Distribution

Recovery Procedure

(OP-902-005)

E. <u>Recovery Actions: Case I. Loss of Offsite Power</u>

EOP Step Content:

Step 1. <u>IF</u> <u>ALL</u> safety <u>AND</u> nonsafety busses are deenergized, <u>THEN</u> go to OP-902-005, DEGRADED ELECTRICAL DISTRIBUTION RECOVERY PROCEDURE, Section E. <u>Recovery Actions: Case II. Station Blackout</u>.

Objective:

The objective of this step is to direct the operator to Case II. Station Blackout, OP-902-005, DEGRADED ELECTRICAL DISTRIBUTION RECOVERY PROCEDURE, when all safety and nonsafety busses are deenergized.

Basis:

In referring the operator to OP-902-005, DEGRADED ELECTRICAL DISTRIBUTION RECOVERY PROCEDURE, Section E. Recovery Actions: Case II. Station Blackout, this step verifies that the operator is in the correct case. When all AC busses are deenergized, the operator shall suspend the use of Case I and go to Case II.

Operational Considerations:

When using Recovery Actions: Case I. Loss of Offsite Power, at least one train of safety busses shall be energized.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 2. Using the Plant Paging System, announce the following two times:

Objective:

The objective of this step is to inform plant personnel of the event.

Basis:

This step serves to gain additional support for the control room personnel and to ensure other site personnel are properly informed of the plant status.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 3. Advise the Shift Supervisor to implement EP-1, EMERGENCY PLAN.

Objective:

The objective of this step is to direct entry into the Emergency Plan for classification of the event and required notifications.

Basis:

This step ensures that action is taken to implement the Emergency Plan to gain additional support for the control room personnel and to ensure the safety of the site personnel and general public.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NUREG-0654, Appendix 1.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 4. Refer to Foldout: Safety Function Status Checklist, AND check ALL criteria are being maintained.

Objective:

This step verifies that all safety functions are being satisfied by comparing control board parameters to the criteria of the Safety Function Status Checklist.

Basis:

This step ensures that all relevant safety functions are being satisfied and that the core is being adequately cooled.

Operational Considerations:

When multiple indicators for one parameter exist, use more than one instrument to obtain a particular reading. The Safety Function Status Checklist shall be continuously monitored throughout the use of this procedure.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 5. IF any criteria of the Foldout: Safety Function Status Checklist are NOT being satisfied, THEN go to OP-902-008, SAFETY FUNCTION RECOVERY PROCEDURE.

Objective:

The purpose of this step is to direct operator actions if the Degraded Electrical Distribution Recovery Procedure is not adequately mitigating the event.

Basis:

If the safety functions are not being satisfied, then the operator is required to leave the Degraded Electrical Distribution Recovery procedure and implement the Safety Function Recovery Procedure. This procedure is functionally oriented and will ensure all safety functions are attended to regardless of what event(s) are occurring.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 6. IF EITHER BUS A2 TO A3S TIE BKR OR BUS A3S TO A2 TIE BKR opens, THEN verify the following:

Objective:

The objective of this step is to verify the Emergency Diesel Generator A is providing electrical power to the A train safety busses.

Basis:

This step verifies that A safety busses are energized to provide power to safety related equipment. One train of safety related equipment operating is sufficient to verify adequate core cooling capability exists and that other safety functions are being satisfied.

Operational Considerations:

Emergency Diesel Generator load should not exceed 4840 KW for two hours nor 4400 KW for continuous loading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 7. IF EITHER BUS B2 TO B3S TIE BKR OR BUS A3S TO A2 TIE BKR opens, THEN verify the following:

Objective:

The objective of this step is to verify the Emergency Diesel Generator B is providing electrical power to the B train safety busses.

Basis:

This step verifies that B safety busses are energized to provide power to safety related equipment. One train of safety related equipment operating is sufficient to verify adequate core cooling capability exists and that other safety functions are being satisfied.

Operational Considerations:

Emergency Diesel Generator load should not exceed 4840 KW for two hours nor 4400 KW for continuous loading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 8. IF any Reactor Coolant Pump is operating AND Component Cooling Water is lost to Reactor Coolant Pumps for ≥3 minutes, THEN stop ALL Reactor Coolant Pumps.

Objective:

The objective of this step is to stop reactor coolant pump operation when component cooling water is lost.

Basis:

When component cooling water is lost to the reactor coolant pumps, damage to pump components could occur if the RCPs are not secured.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. [illegible]ery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 9. IF EFAS-1 OR EFAS-2 has occurred, THEN complete Attachment 5: EFAS-1 Automatic Actions OR Attachment 6: EFAS-2 Automatic Actions.

Objective:

The objective of this step is to verify all actions required by EFAS-1 or EFAS-2 have occurred.

Basis:

Due to the number of valves and pumps actuated by EFAS-1 and EFAS-2, the verification is done by use of a checklist. This step verifies all component actions required by EFAS-1 or EFAS-2.

Operational Considerations:

This step should be performed concurrently with this procedure and preferably by an operator not required for other duties.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 10. Verify Reactor Coolant System temperature is being controlled as follows:

Objective:

The objective of this step is to verify that the reactor coolant system temperature is being controlled at the desired value.

Basis:

Reactor coolant system temperature is controlled at $\leq$550°F so that the reactor coolant system heat inventory is not sufficient to cause steam generator safety valves to lift. The steam bypass control system is the preferred means for control of steam generator pressure because the atmospheric dump valves would allow an unmonitored radioactive release to the environment when primary to secondary leakage exists.

Operational Considerations:

If the automatic function is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameters Value Document. Table 5.3, Temperature.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 11. IF ALL Reactor Coolant Pumps have been stopped, THEN check the following Reactor Coolant Pump restart criteria:

Objective:

The objective of this step is to ensure the reactor coolant system employs the preferred means of coolant circulation.

Basis:

A forced circulation cooldown is preferred to a natural circulation cooldown whenever possible during a recovery from a degraded electrical distribution. By using forced circulation, this action enhances the strategy to obtain an uncomplicated cooldown.

Operational Considerations:

If component cooling water to RCPs has been lost for $\geq$10 minutes, then RCPs should not be restarted. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameters Value Document. Table 5-1, Level and Table 5-2, Subcooling.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 12. IF ALL Reactor Coolant Pump restart criteria (step 11) are satisfied, THEN restart one Reactor Coolant Pump in each loop. Refer to OP-1-002, REACTOR COOLANT PUMP OPERATION, Sections 4.0 AND 6.1.

Objective:

The objective of this step is to ensure the reactor coolant system employs the preferred means of coolant circulation.

Basis:

If forced circulation is possible by starting RCPs, then only one reactor coolant pump in each loop should be operated in an effort to minimize heat input to the reactor coolant system.

Operational Considerations:

If component cooling water to RCPs has been lost for $\geq$10 minutes, then RCPs should not be restarted.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 13. IF Reactor Coolant Pumps are operating, THEN verify Spray Valves selector switch is selected to the loop with the operating Reactor Coolant Pump.

Objective:

The objective of this step is to verify that normal spray is available.

Basis:

With forced circulation of coolant through the core, this action ensures that the normal mode of pressurizer spray is available.

Operational Considerations:

If the pressurizer auxiliary spray was being used, then charging shall be returned to normal lineup. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 14. IF NO Reactor Coolant Pumps are operating, THEN check Natural Circulation by ALL the following:

Objective:

The objective of this step is to check the conditions that indicate natural ciruculation flow exists.

Basis:

When single phase circulation is established in both loops, the RCS indicates all of the following:

a) Loop ΔT (T_H-T_C) less than full power ΔT
b) Cold leg temperatures constant or dropping
c) Hot leg temperatures stable (i.e., not steadily rising) or dropping
d) No abnormal differences between T_H RTDs and core exit thermocouples. Hot leg RTD temperature should be consistent with the core exit thermocouples. Adequate natural circulation flow ensures that core exit thermocouples temperatures will be approximately equal to the hot leg RTDs temperature within the bounds of the instrument's inaccuracies. An abnormal difference between T_H and the CETs is greater then (10)°F.

If all RCP operation is terminated, and when inventory and pressure are controlled, then natural circulation is monitored by heat removal via both steam generators.

Operational Considerations:

This step need be performed only if all reactor coolant pumps have been stopped. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step 14 (continued).

Source Document:

Technical Guideline, Section 5.10, Parameters Value Document. Table 5-1, Level and Table 5-3, Temperature.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 15. IF BOTH Turbine Cooling Water Pumps are NOT operating, THEN locally perform the following:

Objective:

The objective of this step is to ensure that cooling water is available to the instrument air compressors during a loss of offsite power.

Basis:

According to the Nash Engineering Company, the instrument air compressors can operate without a cooling water supply for a maximum time of 30 minutes and not have any damage to the compressor. When Turbine cooling water is not operating, potable water is aligned for cooling of the air compressors.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 16. Maintain Level in BOTH Steam Generators as follows:

Objective:

The objective of this step is to ensure that the steam generator level is maintained in both steam generators.

Basis:

When the steam generators are being used for heat removal from the reactor coolant system, main or emergency feedwater has to be supplied to the steam generator to ensure a heat sink.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 17. IF using Emergency Feedwater to feed Steam Generators, THEN perform the following:

Objective:

This step ensures continuous suction supply to emergency feed pumps.

Basis:

The available condensate inventory should be continually monitored and replenished from available sources as necessary to provide a source for a secondary heat sink.

Operational Considerations:

Obtain permission from control room supervisor prior to aligning auxiliary component cooling system to the emergency feedwater system.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameters Value Document. Table 5-1, Level.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 18. Restore Pressurizer Proportional heaters by the following:

Objective:

The objective of this step is to verify that Pressurizer Proportional heaters are available for pressure control.

Basis:

By ensuring pressure control, limits will be maintained on the post accident pressure and temperature limits graph.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 19. IF Pressurizer level is >28%, THEN verify Pressurizer pressure is being restored by Pressurizer heaters.

Objective:

This step verifies reactor coolant system pressure control when reactor coolant system inventory is restored.

Basis:

By ensuring pressure control, limits will be maintained on the post accident pressure and temperature limits graph.

Operational Considerations:

If the automatic function is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameters Value Document. Table 5-1, Level.

E. <u>Recovery Actions: Case I. Loss of Offsite Power</u>

EOP Step Content:

Step 20. Verify the Pressurizer Level Control System is automatically maintaining <u>OR</u> restoring Pressurizer Level at 33%.

Objective:

This step verifies the RCS inventory control safety function is being performed.

Basis:

The PLCS is verified to be automatically controlling or restoring pressurizer level. If not, charging and letdown are operated manually to ensure pressurizer level is being maintained. This action verifies that the RCS inventory control safety function is being performed.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

If the automatic function is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case 1. Loss of Offsite Power

EOP Step Content:

Step 21. IF normal operating oil pumps are NOT operating, THEN verify the emergency oil pump operating for the following systems:

Objective:

The objective of this step is to verify that at least one oil pump is operating for the turbine, seal oil, main feed pump A, and main feed pump B.

Basis:

When nonsafety busses are deenergized, the normal supplying oil pumps are stopped. To protect equipment from damage, emergency oil pumps are automatically started. The emergency pump for the seal oil system is automatically started to prevented the hydrogen gas in the generator from leaking to the surrounding areas.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 22. IF ALL nonsafety busses are deenergized, THEN locally open one of the following Main Condenser vacuum breaker valves:

Objective:

This objective of this step is to break vacuum for the main condenser.

Basis:

Since gland sealing steam is lost, this step will help prevent air leakage by the seals to the main condenser and by breaking vacuum, the time for turbines to stop rotating is minimized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 23. IF a Main Condenser vacuum breaker valve is open AND Main Condenser vacuum is 0.0" Hg, THEN secure Gland Sealing Steam by locally closing Main Steam to Gland Steam Isolation (MS 148) valve.

Objective:

The objective of this step is to verify the gland sealing steam is isolated.

Basis:

Because steam will not be available from main steam or auxiliary steam, this step ensures that the gland seal steam system is isolated from the main steam piping.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. <u>Recovery Actions: Case I. Loss of Offsite Power</u>

EOP Step Content:

Step 24. IF BUS A2 is deenergized, THEN locally open ALL nonsafety bus load breakers on MCC 314AS AND close bus tie breaker (cubicle 2M).

Objective:

The objective of this step is to remove all nonsafety loads from MCC 314AS prior to energizing the sump pumps in the dry cooling tower.

Basis:

When emergency diesel generator A is supplying electrical power to safety busses, nonsafety load breakers are opened to prevent overloading the generator. Because MCC 314A supplies power to Dry Cooling Tower A sump pumps, the tie breaker has to be closed. Energizing the sump pumps, prevents possible flooding of area when MCC 315AS is located.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

W3P82-0652C, dated March 30, 1982.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 25. IF nonsafety load breakers on MCC 314AS are open, THEN locally close the following Dry Tower Sump pump breakers:

Objective:

The objective of this step is to ensure that the Dry Cooling Tower A sump pumps are energized.

Basis:

Because MCC 315AS is located in area of Dry Cooling Tower, sump pumps are energized to prevent possible flooding of area which would not allow operation of safety related equipment.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

W3P82-0652C, dated March 30, 1982.

E. <u>Recovery Actions: Case I. Loss of Offsite Power</u>

EOP Step Content:

Step 26. IF BUS B2 is deenergized, THEN locally open ALL nonsafety bus load breakers on MCC 314BS AND close bus tie breaker (cubicle 2M).

Objective:

The objective of this step is to remove all nonsafety loads from MCC 314BS prior to energizing the sump pumps in the dry cooling tower.

Basis:

When emergency diesel generator B is supplying electrical power to safety busses, nonsafety load breakers are opened to prevent overloading the generator. Because MCC 314B supplies power to Dry Cooling Tower B sump pumps, the tie breaker has to be closed. Energizing the sump pumps, prevents possible flooding of area where MCC 315BS is located.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

W3P82-0652C, Dated March 30, 1982.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 27. IF nonsafety load breakers on MCC 314.BS are open, THEN locally close the following Dry Tower Sump pump breakers:

Objective:

The objective of this step is to ensure that the Dry Cooling Tower B sump pumps are energized.

Basis:

Because MCC 315 BS is located in area of Dry Cooling Tower, sump pumps are energized to prevent possible flooding of area which would not allow operation of safety related equipment.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

W3P82-0652C, Dated March 30, 1982.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 28. Verify one Main Feed Pump tripped AND associated valves close:

Objective:

This step secures one of the two main feed pumps since only one is required below 50% power.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 29. IF BOTH Main Feed pumps are NOT operating, THEN verify the associated valves close:

Objective:

This step verifies both main Feed Pumps tripped when all nonsafety busses are deenergized.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 30. Stop ALL Heater Drain Pumps.

Objective:

This step secures heater drain pumps which are no longer required below 30% power.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 31. Align the Condensate Pumps as follows:

Objective:

This step secures all condensate pumps which are not required to support the running main feed pump logic.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 32. IF a Main Feed Pump is operating, THEN start Auxiliary Boiler. Refer to OP-5-001, AUXILIARY BOILER, Section 6.3.

Objective:

The objective of this step is to start the auxiliary boiler to supply steam loads, and to permit removal of steam loads from the steam generators.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 33. IF the Auxiliary Boiler is started, THEN transfer Gland Sealing Steam to Auxiliary Boiler as follows:

Objective:

The objective of this step is to transfer the steam load of gland sealing steam to the auxiliary boiler to remove steam loads from the steam generators.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 34. IF EITHER Main Feed Pump is operating, THEN align it to the Auxiliary Boiler as follows:

Objective:

The objective of this step is to transfer the steam load of the main feed pump to the auxiliary boiler to permit removal of loads from the steam generators.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 35. When offsite power is available, restore electrical power to nonsafety busses. Refer to OP-6-001, PLANT DISTRIBUTION (7KV, 4KV, and SSD) SYSTEMS, Section 6.6.3.

Objective:

The objective of this step is to restore electrical distribution to normal lineup.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 36. When electrical power is restored to normal distribution lineup, restore Main Turbine Lube Oil system to normal operation AND place Main Turbine on turning gear. Refer to OP-3-017, TURBINE LUBE OIL SYSTEM, Section 6.1.

Objective:

This objective of this step is to verify that turbine lube oil system is restored to normal lineup and placed on turning gear.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 37. IF Main Feed Pump A is NOT operating AND electrical power is restored, THEN locally restore Main Feed Pump A Turbine Lube Oil System to normal operation AND place Main Feed Pump Turbine on turning gear. Refer to OP-3-003, CONDENSATE-FEEDWATER, Section 6.7.

Objective:

The objective of this step is to verify that main feed pump A turbine lube oil system is restored to normal lineup and placed on turning gear.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 38. IF Main Feed Pump B is NOT operating AND electrical power is restored, THEN locally restore Main Feed Pump B Turbine Lube Oil System to normal operation AND place Main Feed Pump Turbine on turning gear. Refe to OP-3-003, CONDENSATE-FEEDWATER, Section 6.7.

Objective:

This objective of this step is to verify that main feed pump B turbine lube oil system is restored to normal lineup and placed on turning gear.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 39. When eletrical power is restored to normal distribution lineup, locally perform the following:

Objective:

The objective of this step is to verify that seal oil system is restored to normal lineup.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 40. When electrical power is restored to normal distribution, start a Turbine Cooling Water Pump. Refer to OP-03-027, TURBINE COOLING WATER SYSTEM.

Objective:

The objective of this step is to verify that turbine cooling water system is restored to normal lineup.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 41. IF a Turbine Cooling Water Pump is operating, THEN locally align Instrument Air Compressors cooling to the Turbine Closed Cooling Water system by the following"

Objective:

The objective of this step is to ensure that cooling water for the instrument air compressors is aligned to the normal source of cooling.

Basis:

When turbine cooling water system is restored to normal lineup, the instrument air compressors are aligned to the normal source of cooling.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 42. When electrical power is restored to normal distribution lineup, check the following Reactor Coolant Pump restart criteria:

Objective:

The objective of this step is to ensure the reactor coolant system employs the preferred means of coolant circulation.

Basis:

A forced circulation cooldown is preferred to a natural circulation cooldown whenever possible during a recovery from a degraded electrical distribution. By using forced circulation, this action enhances the strategy to obtain an uncomplicated cooldown.

Operational Considerations:

If component cooling water to RCPs has been lost for $\geq$10 minutes, then RCPs should not be restarted. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameters Value Document. Table 5-1, Level and Table 5-2, Subcooling.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 43. IF ALL Reactor Coolant Pump restart criteria (step 42) are satisfied, THEN restart one Reactor Coolant Pump in each loop. Refer to OP-1-002, REACTOR COOLANT PUMP OPERATION, Sections 4.0 AND 6.1.

Objective:

The objective of this step is to ensure the reactor coolant system employs the preferred means of coolant circulation.

Basis:

If forced circulation is possible by starting RCPs, then only one reactor coolant pump in each loop should be operated in an effort to minimize heat input to the reactor coolant system.

Operational Considerations:

If component cooling water to RCPs has been lost for $\geq$10 minutes, then RCPs should not be restarted.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. <u>Recovery Actions: Case I. Loss of Offsite Power</u>

EOP Step Content:

Step 44. IF Reactor Coolant Pumps are operating, THEN verify Spray Valves selector switch is selected to the loop with the operating Reactor Coolant Pump.

Objective:

The objective of this step is to verify that normal spray is available.

Basis:

With forced circulation of coolant through the core, this action ensures that the normal mode of pressurizer spray is available.

Operational Considerations:

If the pressurizer auxiliary spray was being used, then charging shall be returned to normal lineup. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 45. Prior to Plant startup, complete OP-10-001, GENERAL PLANT OPERATIONS, Attachment 8.17: Post Reactor Trip Review.

Objective:

This step reminds the operator to complete the Post Reactor Trip Review as soon as possible. Therefore information concerning the reactor trip is recorded as soon as possible.

Basis:

The operator is directed to complete the Post Reactor Trip Review when either personnel are available or time is available. However, emphasis is placed on completing the review as soon as possible.

Operational Considerations:

Prior to closing reactor trip breakers, OP-10-001, GENERAL PLANT OPERATIONS, Attachment 8.17, Post Reactor Trip Review, shall be completed.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 46. When electrical power is restored to normal distribution lineup AND a Plant startup is planned, to to OP-10-001, GENERAL PLANT OPERATIONS, Section 6.3.

Objective:

This step directs the operator to the startup section in OP-10-001, GENERAL PLANT OPERATIONS, and provides system parameters to be maintained.

Basis:

At this point, the plant status should be evaluated. If necessary, a cooldown and depressurization to SCS entry conditions should be started until finally, shutdown cooling is commenced.

Operational Considerations:

Before startup can commence, the Post Reactor Trip Review must be completed.

Main feedwater must be available for startup.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 47. IF Plant cooldown is planned AND BOTH of the following conditions are satisfied, THEN go to OP-10-001, GENERAL PLANT OPERATIONS, Section 6.8.

Objective:

This step directs the operator to the procedure for a normal cooldown with main feedwater available.

Basis:

If main feedwater is available, the operator can cooldown utilizing the normal operating procedure.

Operational Considerations:

If main feedwater is not available a cooldown must be done using the remainder of this procedure.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 48. Direct Chemistry Department to sample Reactor Coolant System AND Pressurizer for boron concentration.

Objective:

This step obtains activity levels of reactor coolant. Boron concentration is sampled to check for shutdown margin as per technical specifications.

Basis:

These samples serve as aids to identify the shutdown margin, and to determine whether the pressurizer boron concentration is equalized with that of the reactor coolant system.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 49. Verify Shutdown Margin in accordance with Technical Specifications. Refer to OP-903-090, SHUTDOWN MARGIN.

Objective:

The objective of this step is to verify the shutdown margin conforms to the Technical Specification.

Basis:

Due to the cooldown of the plant in the remainder of this procedure, the shutdown margin for reactor coolant system shall be determined in accordance with Technical Specification requirements.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-903-090, SHUTDOWN MARGIN.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 50. IF Reactor Coolant Pumps are operating, THEN go to Step 59.

Objective:

The objective of this step is to ensure the preferred method of cooldown is used if the reactor coolant pumps are available.

Basis:

When the reactor coolant pumps are operating, then this step directs the operator to step 59 to perform a forced circulation cooldown. Natural circulation is not as efficient as forced circulation for cooling the isolated steam generator; therefore, if possible, the forced circulation cooldown should be utilized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 51. Check AND continuously monitor Natural Circulation by ALL the following:

Objective:

The objective of this step is to check the conditions that indicate natural circulation flow exists.

Basis:

During cooldown and depressurization to shutdown cooling initiating conditions, indications of natural circulation have to be verified. When single phase circulation is established, the RCS indicates all of the following:

a) Loop ΔT (T_H-T_C) less than full power ΔT

b) Cold leg temperatures constant or dropping

c) Hot leg temperatures stable (i.e., not steadily rising) or dropping

d) No abnormal differences between T_H RTDs and core exit thermocouples. Hot leg RTD temperature should be consistent with the core exit thermocouples. Adequate natural circulation flow ensures that core exit thermocouples temperatures will be approximately equal to the hot leg RTDs temperature within the bounds of the instrument's inaccuracies. An abnormal difference between T_H and th CETs is greater than (10)°F.

If all RCP operation is terminated, and when inventory and pressure are controlled, then natural circulation is monitored by heat removal via both steam generators.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step 51 (continued).

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameters Value Document. Table 5-1, Level and Table 5-3, Temperature.

E. <u>Recovery Actions: Case I. Loss of Offsite Power</u>

EOP Step Content:

Step 52. When a Steam Generator Low Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

The objective of this step is to prevent a main steam isolation signal from occurring and inhibiting cooldown.

Basis:

During a controlled cooldown and depressurization the automatic operation of certain safeguard systems is undesirable. Therefore, the MSIS setpoint must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 53. Commence Plant cooldown to obtain Cold Leg temperature of 350°F by either of the following:

Objective:

This step provides methods to continue the cooldown of the reactor coolant system to the shutdown coolant initiation conditions.

Basis:

An orderly cooldown and depressurization is resumed with the steam generator not isolated. These methods are presented in order, with the most preferred method listed first, to minimize radiological releases.

Operational Considerations:

Limit cooldown rate for reactor coolant system $\leq$50°F/hr. and for pressurizer $\leq$100°F/hr. During cooldown and depressurization maintain Subcooling Margin 28°F to 200°F. Refer to Attachment 11: Post-Accident Pressure and Temperature Limit Graph. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 54. When a Low Pressurizer Pressure Pretrip alarm occurs, reset the setpoint:

Objective:

This step prevents a containment isolation or safety injection actuation signal from occurring.

Basis:

During a controlled cooldown and depressurization, the automatic operation of certain safeguard systems is undesirable. Therefore, the setpoint of CIAS and SIAS must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 55. Commence Plant depressurization to 375 psia using Pressurizer Auxiliary Spray as follows:

Objective:

The objective of this step is to depressurize the reactor coolant system to shutdown cooling entry conditions.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point when it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

During cooldown and depressurization, maintain subcooling margin 28°F to 200°F. Refer to Attachment 5: Post-Accident Pressure and Temperature Limit Graph.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 56. Monitor for Reactor Coolant System voiding as indicated by:

Objective:

This step provides guidance for detecting voids in the reactor coolant system.

Basis:

Since there are certain reactor coolant system conditions for which the presence of voids is acceptable, then voids are not a problem as long as the core and reactor coolant system heat removal and the reactor coolant system inventory safety functions are being satisfied. If these safety functions are not being satisfied or voiding is causing the reactor coolant system to remain pressurized above the shutdown cooling entry conditions, then this step will indicate voids. If voids are indicated, then step 57 will be performed.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 57. IF Reactor Coolant System voiding is indicated, THEN perform the following:

Objective:

This step provides methods to eliminate voids of the reactor coolant system.

Basis:

IF voiding was indicated in the previous step, THEN eliminate the voids if either of the following exists:

1. The following safety functions are NOT being satisfied:
   a. Core heat removal
   b. Reactor coolant system heat removal
   c. Reactor coolant system inventory

   OR

2. The Reactor coolant system remains pressurized above shutdown cooling entry conditions because of reactor coolant system voids present.

Operational Considerations:

If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper positions. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 58. IF ALL required actions of Natural Circulation Cooldown (Step 51-57) were completed, THEN go to Step 65.

Objective:

This step ensures that the operator continues this procedure to the shutdown cooling entry conditions.

Basis:

This step directs the operator to bypass the portion of this procedure which pertains to forced circulation cooldown. The remainder of this procedure would then be utilized to ensure that the shutdown cooling entry conditions are satisfied.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 59. IF more than one Reactor Coolant Pump is operating per loop, THEN stop Reactor Coolant Pumps which are NOT required for one per loop operation:

Objective:

The objective of this step is to secure one reactor coolant pump in each loop to reduce RCS heat input.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 60. Verify Spray Valves selector switch is selected to the loop with the operating Reactor Coolant Pump.

Objective:

The objective of this step is to verify that normal spray is available.

Basis:

With forced circulation of coolant through the core, this action ensures that the normal mode of pressurizer spray is available.

Operational Considerations:

If the pressurizer auxiliary spray was being used, then charging shall be returned to normal lineup. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operations.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 61. When a Steam Generator Low Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

The objective of this step is to prevent a main steam isolation signal from occurring and inhibiting cooldown.

Basis:

During a controlled cooldown and depressurization the automatic operation of certain safeguard systems is undesirable. Therefore, the MSIS setpoint must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 62. Commence Plant cooldown to obtain Cold Leg temperature of 350°F by either of the following:

Objective:

This step provides methods to continue the cooldown of the reactor coolant system to the shutdown coolant initiation conditions.

Basis:

An orderly cooldown and depressurization is resumed with the steam generator not isolated. These methods are presented in order, with the most preferred method listed first, to minimize radiological releases.

Operational Considerations:

Limit cooldown rate for reactor coolant system ≤50°F/hr. and for pressurizer ≤100°F/hr. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 63. When a Low Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

This step prevents a containment isolation or safety injection actuation signal from occurring.

Basis:

During a controlled cooldown and depressurization the automatic operation of certain safeguard systems is undesirable. Therefore, the CIAS and SIAS must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 64. Commence Plant depressurization to 375 psia using either of the following:

Objective:

The objective of this step is to depressurize the RCS to shutdown cooling entry conditions.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

During cooldown and depressurization, maintain subcooling margin 28°F to 200°F. Refer to Attachment 11: Post-Accident Pressure and Temperature Limit Graph. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. Below 1000 psia, Subcooling Margin shall be determined by subtracting Hot Leg temperature from PRESSURIZER TEMPERATURE WATER (TI 101).

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 65. IF using Main Feedwater to feed Steam Generators AND Cold Leg temperature $\leq$450°F, THEN perform the following:

Objective:

This step secures main feed and aligns the condensate system to feed the steam generators.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 66. IF using Emergency Feedwater to feed Steam Generators, THEN perform the following:

Objective:

This step ensures continuous suction supply to emergency feed pumps.

Basis:

The available condensate inventory should be continually monitored and replenished from available sources as necessary to provide a source of a secondary heat sink.

Operational Considerations:

Obtain permission from control room supervisor prior to aligning auxiliary component cooling system to the emergency feedwater system.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameters Valve Document. Table 5-1, Level.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 67. When Pressurizer pressure is lowered to 650 psia, lower Safety Injection Tank pressure to between 300 psig AND 235 psig by operating the following SAFETY INJECTION TANKS vent valves:

Objective:

This step reduces safety injection tank pressure to prevent dumping tanks into the reactor coolant system.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point when it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 68. When Pressurizer pressure is <400 psia, place the RPS/ESFAS PZR PRESS BYPASS switch to "BYPASS" on ALL four channels of Plant Protection System.

Objective:

This step prevents SIAS and CIAS below minimum reset setpoint for low pressurizer pressure.

Basis:

During cooldown and depressurization, the automatic operation of certain safeguard systems is undesirable.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 69. When Pressurizer pressure is between 392 psia AND 350 psia, perform the following:

Objective:

This step isolates the safety injection tanks.

Basis:

The safety injection tanks should be isolated, vented, and drained at 250 psig to avoid introducing their nitrogen cover gas into the RCS and increasing the severity of the event.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 70. When the following conditions are established, maintain them as follows:

Objective:

This step establishes and maintains shutdown cooling entry conditions to provide a smooth transition into General Plant Operating Procedure.

Basis:

This activity places the plant in an operational mode where a complete cooldown and depressurization of the plant can take place.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case I. Loss of Offsite Power

EOP Step Content:

Step 71. Record Pressurizer Spray Cycles.

Objective:

This step documents the number of spray cycles.

Basis: (Technical Specification 5.7)

The components identified in Table 5.7-1 are designed and shall be maintained within the cycle or transient limits of Table 5.7-1.

Operational Considerations:

The number of cycles is determined by comparing the Pressurizer pressure recorder to the time frame of the event.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. <u>Recovery Actions: Case I. Loss of Offsite Power</u>

EOP Step Content:

Step 72. Go to OP-10-001, GENERAL PLANT OPERATIONS, Section 6.9 <u>AND</u> continue cooldown as directed by the Control Room Supervisor.

Objective:

The objective of this step is to exit the emergency procedures and enter normal plant operating procedures.

Basis:

This step allows operational personnel to continue operating or cooldown further in accordance with normal operating procedures rather than emergency procedures. This also serves to limit the length of emergency procedures.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 1. Using the Plant Paging System announce the following two times:

Objective:

The objective of this step is to inform plant personnel of the event.

Basis:

This step serves to gain additional support for the control room personnel and to ensure other site personnel are properly informed of the plant status.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 2. Advise the Shift Supervisor to implement EP-1, EMERGENCY PLAN.

Objective:

The objective of this step is to direct entry into the Emergency Plan for classification of the event and required notifications.

Basis:

This step ensures that action is taken to implement the Emergency Plan to gain additional support for the control room personnel and to ensure the safety of the site personnel and general public.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NUREG-0654, Appendix 1.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 3. Refer to Foldout: Safety Function Status Checklist AND check ALL criteria are being maintained.

Objective:

This step verifies that all safety functions are being satisfied by comparing control board parameters to the criteria of the Safety Function Status Checklist.

Basis:

This step ensures that all relevant safety functions are being satisfied and that the core is being adequately cooled.

Operational Considerations:

When multiple indicators for one parameter exist, use more than one instrument to obtain a particular reading. The Safety Function Status Checklist shall be continuously monitored throughout the use of this procedure.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 4. IF any criteria of the Foldout: Safety Function Status Checklist are NOT being satisfied, THEN go to OP-902-008, SAFETY FUNCTION RECOVERY PROCEDURE.

Objective:

The purpose of this step is to direct operator actions if the Degraded Electrical Distribution Recovery Procedure is not adequately mitigating the event.

Basis:

If the safety functions are not being satisfied, then the operator is required to leave the Degraded Electrical Distribution Recovery procedure and implement the Safety Function Recovery Procedure. This procedure is functionally oriented and will ensure all safety functions are attended to regardless of what event(s) are occurring.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 5. Record the time of the Station Blackout in the Control Room Log.

Objective:

The objective of this step is to record the time that all AC busses are deenergized.

Basis:

The plant can be safely controlled with all AC busses deenergized for two hours without jeopardizing safety functions. The A and B battery duty cycles will be in excess of 2 hours when certain loads (specified in the source document) are removed from the batteries.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 6. Verify BOTH CNTMT ISOL VLVS closed:

Objective:

The objective of this step is to verify that all sources of inventory loss are secured.

Basis:

When all methods of makeup to the Reactor Coolant System are lost, the sources of inventory removal have to be isolated.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 7. Verify the following RCS SAMPLING ISOLATION valves closed:

Objective:

The objective of this step is to verify that all sources of inventory loss are secured.

Basis:

When all methods of makeup to the Reactor Coolant system are lost, the sources of inventory removal have to be isolated.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 8. Close RCP BLEED-OFF RELIEF VLV ISOL (RC 602)

Objective:

The objective of this step is to verify that all sources of inventory loss are secured.

Basis:

When all methods of makeup to the Reactor Coolant System are lost, the sources of inventory removal have to be isolated.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983

E. <u>Recovery Actions: Case II. Station Blackout</u>

EOP Step Content:

Step 9. Verify the following valves closed:

Objective:

The objective of this step is to verify that all sources of inventory loss are secured.

Basis:

When all methods of makeup to the Reactor Coolant System are lost, the sources of inventory removal have to be isolated.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 10. IF Emergency Diesel Generator A did NOT start AND Emergency Diesel Generator A breaker did NOT close, THEN perform EITHER of the following:

Objective:

The objective of this step is to attempt to start Emergency Diesel Generator A inorder to provide electrical power to the A train safety busses.

Basis:

This step attempts to energize A safety busses inorder to provide power to safety related equipment. One train of safety related equipment operating is sufficient to verify adequate core cooling capability exists and that other safety functions are being satisfied.

Operational Considerations:

Emergency Diesel Generator load should not exceed 4840 KW for two hours nor 4400 KW for continuous loading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 11. IF Emergency Diesel Generator B did NOT start AND Emergency Diesel Generator B breaker did NOT close, THEN perform EITHER of the following:

Objective:

The objective of this step is to attempt to start Emergency Diesel Generator B inorder to provide electrical power to the B train safety busses.

Basis:

This step attempts to energize B safety busses inorder to provide power to safety related equipment. One train of safety related equipment operating is sufficient to verify adequate core cooling capability exists and that other safety functions are being satisfied.

Operational Considerations:

Emergency Diesel Generator load should not exceed 4840 KW for two hours nor 4400 KW for continuous loading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 12. IF Emergency Diesel Generator A OR B is operating, THEN go to step 31.

Objective:

The objective of this step is to have the operator go to the recovery section of this procedure when an emergency diesel generator is started.

Basis:

When an emergency diesel generator is started and is providing power to a safety train, the operator will go to step 31 to cooldown and depressurize the plant.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 13. Locally open the following breaker on PDP 3MA-S:

Objective:

The objective of this step is to secure unnecessary loads on the batteries.

Basis:

The plant can be safely controlled with all AC busses deenergized, but the time is restricted by the battery cycles. By opening the breakers for these loads, the battery duty cycles will be in excess of 2 hours. Within 2 hours, operability will be restored by offsite power or an emergency diesel generator.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 14. Locally open the following breaker on PDP 3MB-S:

Objective:

The objective of this step is to secure unnecessary loads on the batteries.

Basis:

The plant can be safely controlled with all AC busses deenergized, but the time is restricted by the battery cycles. By opening the breakers for these loads, the battery duty cycles will be in excess of 2 hours. Within 2 hours, operability will be restored by offsite power or an emergency diesel generator.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 15. Locally open the following breaker on PDP 3MC-S:

Objective:

The objective of this step is to secure unnecessary loads on the batteries.

Basis:

The plant can be safely controlled with all AC busses deenergized, but the time is restricted by the battery cycles. By opening the breakers for these loads, the battery duty cycles will be in excess of 2 hours. Within 2 hours, operability will be restored by offsite power or an emergency diesel generator.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 16. Locally open the following breaker on PDP 3MD-S:

Objective:

The objective of this step is to secure unnecessary loads on the batteries.

Basis:

The plant can be safely controlled with all AC busses deenergized, but the time is restricted by the battery cycles. By opening the breakers for these loads, the battery duty cycles will be in excess of 2 hours. Within 2 hours, operability will be restored by offsite power or an emergency diesel generator.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 17. IF EITHER of the following conditions exists, THEN throttle OR stop Emergency Feedwater flow to the Steam Generator:

Objective:

The objective of this step is to prevent excessive cooldown of the Reactor Coolant System.

Basis:

If either of the conditions exists, emergency feedwater is throttled or stopped to prevent Pressurizer level from dropping to a critical point. This level drop could cause voids in the Reactor Vessel head. If a steam bubble forms in the vessel head, then adequate core cooling could not be verified.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. If the automatic function is not operating properly, then systems should be placed in manual. systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level.

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 18. Verify Emergency Feedwater Pump AB Turbine operating with BOTH of the following valves open:

Objective:

The objective of this step is to verify that both steam supply valves are open for the AB Emergency Feedwater pump.

Basis:

Since AB Emergency Feedwater pump is the only source of water to the Steam Generators, the steam supply valves to the turbine shall be verified open.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 19. When Condensate Storage Pool level ≤97.7%, verify Condensate Storage Pool automatic makeup.

Objective:

This step ensures that the operator verifies actuation of automatic makeup to CSP, and that a continued source of water is supplied to the Emergency Feedwater System when condensate storage pool level drops.

Basis:

When condensate storage pool level drops to 97.7% the automatic makeup valve should start opening.

Operational Considerations:

Bypassing the condensate storage pool makeup valve will require close monitoring to prevent overfill. If the automatic action is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 20. Evaluate Condensate -age Pool inventory. Refer to Attachment 3: Feedwater Capaci rsus Time Remaining at Hot Standby AND Attachment 4: Feedwater Required for a Cooldown to Tc (Required) versus Tc (Initial).

Objective:

The Control Room Supervisor determines the amount of water necessary for cooldown and time remaining before cooldown must begin.

Basis:

At this point, the plant status should be evaluated. The Station Blackout could last for 2 hours and inventory has to be evaluated to verify that a cooldown can be performed when AC power is restored.

Operational Considerations:

Without main feedwater, cooldown to shutdown cooling entry conditions must begin as soon as possible to ensure adequate inventory in the condensate storage pool to avoid usage of auxiliary component cooling water.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 21. Check AND continuously monitor Natural Circulation by ALL the following:

Objective:

The objective of this step is to check the conditions that indicate natural circulation flow exists.

Basis:

During a station Blackout followed by a cooldown and depressurization to shutdown cooling initiating conditions, indications of natural circulation have to be verified. When single phase circulation is established, the RCS indicates all of the following:

a) Loop ΔT (T_H-T_C) less than full power ΔT
b) Cold leg temperatures constant or dropping
c) Hot leg temperatures stable (i.e., not steadily rising) or dropping
d) No abnormal differences between T_H RTDs and core exit thermocouples. Hot leg RTD temperature should be consistent with the core exit thermocouples. Adequate natural circulation flow ensures that core exit thermocouples temperatures will be approximately equal to the hot leg RTDs temperature within the bounds of the instrument's inaccuracies. An abnormal difference between T_H and the CETs is greater then (10)°F.

When inventory and pressure are controlled, natural circulation is monitored by heat removal via both steam generators.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step 21 (continued).

Source Document:

Technical Guideline, Section 5.10, parameters Value Document. Table 5-1, Level and Table 5-3, Temperature.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 22. Perform ALL the following:

Objective:

The objective of this step is to verify that the emergency oil pumps are operating for the turbine, seal oil, main feed pump A, and main feed pump B.

Basis:

When nonsafety busses are deenergized, the normal supplying oil pumps are stopped. To protect equipment from damage, emergency oil pumps are automatically started. The emergency pump for the seal oil system is automatically started to prevent the hydrogen gas in the generator from leaking to the surrounding areas.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 23. Locally open one of the following Main Condenser vacuum breaker valves:

Objective:

The objective of this step is to break vacuum for the main condenser.

Basis:

Since gland sealing steam is lost, this step will help prevent air leakage by the seals to the main condenser and by breaking vacuum, the time for turbines to stop rotating is minimized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 24. When a Main Condenser vacuum breaker valve is open AND Main Condenser vacuum is 0.0" Hg, secure Gland Sealing Steam by locally closing Main Steam to Gland Steam Isolation (MS 148) valve.

Objective:

The objective of this step is to verify that gland sealing steam is isolated.

Basis:

Because steam will not be available from main steam or auxiliary steam, this step ensures that the gland seal steam system is isolated from the main steam piping.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 25. Verify the following valves closed for BOTH Steam Generators:

Objective:

The objective of this step is to verify that the steam generators are isolated.

Basis:

Since inventory for emergency feedwater can be critical when Station Blackout is extended to two hours, the steam generators are isolated to help control heat removal.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 26. Verify the following isolation valves closed:

Objective:

The objective of this step is to verify that the component cooling water isolation valves to the Reactor Coolant Pumps are closed.

Basis:

During a Station Blackout, before electrical power is restored, component cooling water is isolated to the reactor coolant pumps. This action will prevent thermal shocking the reactor coolant pump seals which could cause seal failures.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 27. IF Emergency Diesel Generator A is restored to operability AND offsite power is NOT available, THEN energize the A safety busses by closing GEN BREAKER A.

Objective:

The objective of this step is to verify that Emergency Diesel Generator A is providing electrical power to the A train safety busses.

Basis:

This step verifies that A safety busses are energized to provide power to safety related equipment. One train of safety related equipment operating is sufficient to verify adequate core cooling capability exists and that other safety functions are being satisfied.

Operational Considerations:

Emergency Diesel Generator load should not exceed 4840 KW for two hours nor 4400 KW for continuous loading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 28. IF Emergency Diesel Generator B is restored to operability AND offsite power is NOT available, THEN energize the B safety busses by closing GEN BREAKER B.

Objective:

The objective of this step is to verify that Emergency Diesel Generator B is providing electrical power to the B train safety busses.

Basis:

This step verifies that B safety busses are energized to provide power to safety related equipment. One train of safety related equipment operating is sufficient to verify adequate core cooling capability exists and that other safety functions are being satisfied.

Operational Considerations:

Emergency Diesel Generator load should not exceed 4840 KW for two hours nor 4400 KW for continuous loading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 29. IF notified that electrical power is available to Startup Transformers AND Emergency Diesel Generators A AND B are NOT available, THEN restore electrical power with the Startup Transformers. Refer to OP-6-001, PLANT DISTRIBUTIONS (7KV, 4KV, and SSD) SYSTEMS, Section 6.1.

Objective:

The objective of this step is to restore electrical distribution to normal lineup.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 30. IF notified that electrical power is available to Startup Transformers AND Emergency Diesel Generators A AND B are operating, THEN restore electrical power to normal distribution lineup. Refer to OP-6-001, PLANT DISTRIBUTIONS (7KV, 4KV, and SSD) SYSTEMS, Section 6.3.

Objective:

The objective of this step is to restore electrical distribution to normal lineup.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 31. IF CIAS has occurred, THEN open CNTMT ISOLATION INSTRUMENT AIR (IA 908) valve.

Objective:

The objective of this step is to verify that instrument air is available to containment.

Basis:

If instrument air is isolated from containment, then it has to be aligned so that pneumatic valves can be operable.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 32. IF SIAS has NOT occurred, THEN restore normal Charging AND Letdown to maintain Pressurizer level as follows:

Objective:

The objective of this step is to restore normal pressurizer level control.

Basis:

The preferred means of controlling pressurizer level is by the chemical and volume control system. To exit this procedure under stable plant conditions and enter the plant operating procedure at a point where it will take over control of the plant, certain steps must be performed which would ensure that the plant controlling systems are in proper alignment.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 33. Open RCP BLEED-OFF RELIEF VLV ISOL (RC 602)

Objective:

The objective of this step is to restore reactor coolant pump bleedoff to normal lineup.

Basis:

When chemical volume and control system is restored to normal lineup, the reactor coolant pump bleedoff is aligned to the volume control tank. This action will verify that inventory control is balanced by the chemical volume and control system.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 34. When BUS A3S is energized, verify Emergency Feedwater pump A operating.

Objective:

The objective at this step is to verify that Emergency Feedwater pump A is operating when power is restored.

Basis:

When the steam generators are being used for heat removal from the reactor coolant system, emergency feedwater has to be supplied to the steam generator to ensure a heat sink. For reliability, motor driven emergency feedwater pumps are verified operating when the appropriate electrical bus is energized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 35. When BUS B3S is energized, verify Emergency Feedwater pump B operating.

Objective:

The objective at this step is to verify that Emergency Feedwater pump B is operating when power is restored.

Basis:

When the steam generators are being used for heat removal from the reactor coolant system, emergency feedwater has to be supplied to the steam generator to ensure a heat sink. For reliability, motor driven emergency feedwater pumps are verified operating when the appropriate electrical bus is energized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 36. IF SIAS AND CIAS have occurred, THEN complete Attachment 7: SIAS Automatic Actions, AND Attachment 8: CIAS Automatic Actions.

Objective:

The objective of this step is to verify all actions required by any automatic actuated signal have occurred.

Basis:

Due to the number of valves, pumps, fans, and other equipment actuated by automatic safety signals, the verification is done by use of a checklist. The actuation signals are verified in immediate actions only so far as to ensure the actuation signal is valid. This step verifies all component actions required by SIAS and CIAS.

Operational Considerations:

This step should be performed concurrently with this procedure and preferably by an operator not required for other duties.

EPG Step Content:

NA

Justification of Differences:

This step included verification of all automatic actions that may have occurred.

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 37. IF SIAS has occurred, THEN check the following Safety Injection termination criteria:

Objective:

This step evaluates certain criteria associated with terminating safety injection flow.

Basis:

If an SIAS has been initiated and the SIS is operating, it must continue to operate at full capacity until SIS termination criteria are met. Early termination may be desirable when the criteria are met to preclude PTS situations or HPSI pump damage (e.g., shaft seals).

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level and Table 5-2, Subcooling.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 38. IF SIAS has occurred AND ALL Safety Injection termination criteria (Step 36) are satisfied, THEN throttle OR stop Safety Injection FLOW one train at a time AND stop Charging Pumps as necessary to control Pressurizer level 33% to 60%.

Objective:

The step maintains pressurizer level and prevents solid water operation.

Basis:

If the criteria are all met, the operator may either terminate or throttle the SIS. The operator may decide to throttle rather than terminate if SIS is to be used to control pressurizer level or plant pressure. Termination of SIS should be sequenced by stopping one pump at a time while observing the termination criteria.

Operational Considerations:

Solid water operation is permissible only when Reactor Coolant System subcooling margin is <28°F. To throttle Cold Leg injection valves, the switch must be taken to the "MORE" position which places them in SIAS override. Maintain subcooling margin 28°F to 200°F. Refer to Attachment 1: Post-Accident Pressure and Temperature Limit Graph.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameter Values Document. Table 5-2, Subcooling.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 39. IF the following conditions exist, THEN reinitiate Safety Injection flow:

Objective:

This step allows initiation of SIS flow should conditions warrant the need.

Basis:

If any of the criteria of step 36 cannot be maintained, the safety injection pumps must be restarted whenever necessary to satisfy all the criteria.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 40. IF SIAS has occurred, THEN within 30 minutes to 1 hour from the time SIAS occurred, terminate Emergency Boration as follows:

Objective:

This step terminates emergency boration after an SIAS.

Basis:

Suction of the charging pumps should be realigned within thirty minutes to one hour for operational considerations.

Operational Considerations:

Thirty minutes to one hour time frame ensures adequate shutdown margin.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 41. When A AND B safety busses are energized, locally close the following breakers.

Objective:

The objective of this step is to restore electrical loads on distribution panels after electrical power is restored to normal distribution lineup.

Basis:

The action of this step is to ensure that electrical loads are restored to normal lineup so that all instrumentation is available to the control room operators.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 42. Restore Pressurizer Proportional heaters by the following:

Objective:

The objective of this step is to verify that Pressurizer Proportional heaters are available for pressure control.

Basis:

By ensuring pressure control, limits will be maintained on the post accident pressure and temperature limits graph.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 43. IF Pressurizer level is >28%, THEN verify Pressurizer pressure is being restored by Pressurizer heaters.

Objective:

This step verifies reactor coolant system pressure control when reactor coolant system inventory is restored.

Basis:

By ensuring pressure control, limits will be maintained on the post accident pressure and temperature limits graph.

Operational Considerations:

If the automatic function is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level.

E. <u>Recovery Actions: Case II. Station Blackout</u>

EOP Step Content:

Step 44. <u>IF</u> SIS <u>AND</u> CIAS HAVE OCCURRED, <u>THEN</u> reset SIAS <u>AND</u> CIAS. Refer to Attachment 9: SIAS and CIAS Reset Procedure.

Objective:

The objective of this step is to ensure that automatic actuation of SIAS and CIAS is available.

Basis:

Before component statuses are changed in this procedure, as the cooldown progresses, automatic engineered safeguards protection shall remain available until the reactor coolant system is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 45. IF SIAS occurred AND has been reset, THEN restore normal Charging AND Letdown to maintain Pressurizer level as follows:

Objective:

The objective of this step is to restore normal pressurizer level control.

Basis:

The preferred means of controlling pressurizer level is by the chemical and volume control system. To exit this procedure under stable plant conditions and enter the plant operating procedure at a point where it will take over control of the plant, certain steps must be performed which would ensure that the plant controlling systems are in proper alignment.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 46. Cpen RCP BLEED-OFF RELIEF VLV ISOL (RC 602)

Objective:

The objective of this step is to restore reactor coolant pump bleedoff to normal lineup.

Basis:

When chemical volume and control system is restored to normal lineup, the reactor coolant pump bleedoff is aligned to the volume control tank. This action will verify that inventory control is balanced by the chemical volume and control system.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

ECP Step Content:

Step 47. Direct Chemistry Department to sample Reactor Coolant System AND Pressurizer for boron concentration.

Objective:

This step obtains activity levels of reactor coolant. Boron concentration is sampled to check for shutdown margin as per technical specifications.

Basis:

These samples serve as aids to identify the shutdown margin, and to determine whether the pressurizer boron concentration is equalized with that of the reactor coolant system.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 48. Verify Shutdown Margin in accordance with Technical Specifications. Refer to OP-903-090, SHUTDOWN MARGIN.

Objective:

The objective of this step is to verify the shutdown margin conforms to the Technical Specification.

Basis:

Due to the cooldown of the plant in the remainder of this procedure, the shutdown margin for reactor coolant system shall be determined in accordance with Technical Specification requirements.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-903-090, SHUTDOWN MARGIN.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 49. IF an Emergency Diesel Generator is operating AND NO Turbine Cooling Water Pump is operating, THEN locally perform the following:

Objective:

The objective of this step is to ensure that cooling water is available to the instrument air compressors when electrical power is restored to safety busses.

Basis:

According to the Nash Engineering Company, the instrument air compressors can operate without a cooling water supply for a maximum time of 30 minutes with no damage to the compressor. When turbine cooling water is not operating, potable water is aligned for cooling of the air compressors.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

LW3-1666-83 dated December 12, 1983.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 50. When electrical power is restored to normal distribution lineup, restore Main Turbine Lube Oil system to normal operation AND place Main Turbine on turning gear. Refer to OP-3-017, TURBINE LUBE OIL SYSTEM, Section 6.1.

Objective:

The objective of this step is to verify that turbine lube oil system is restored to normal lineup and placed on turning gear.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 51. When electrical power is restored to nonsafety BUS A2, locally restore Main Feed Pump A Turbine Lube Oil System to normal operation AND place Main Feed Pump Turbine on turning gear. Refer to OP-3-003, CONDENSATE-FEEDWATER, Section 6.7.

Objective:

The objective of this step is to verify that main feed pump A turbine lube oil system is restored to normal lineup and placed on turning gear.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 52. When electrical power is restored to nonsafety BUS B2, locally restore Main Feed Pump B Turbine Lube Oil System to normal operation AND place Main Feed Pump Turbine on turning gear. Refer to OP-3-003, CONDENSATE-FEEDWATER, Section 6.7.

Objective:

The objective of this step is to verify that main feed pump B turbine lube oil system is restored to normal lineup and placed on turning gear.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 53. When electrical power is restored to normal distribution lineup, locally perform the following:

Objective:

The objective of this step is to verify that seal oil system is restored to normal lineup.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 54. When electrical power is restored to either nonsafety BUS A2 OR BUS B2, start a Turbine Cooling Water Pump. Refer to OP-03-027, TURBINE COOLING WATER SYSTEM.

Objective:

The objective of this step is to verify that turbine cooling water system is restored to normal lineup.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 55. IF a Turbine Cooling Water Pump is operating AND Instrument Air Compressors have been aligned to Potable Water System, THEN locally align Seal Water Cooler to the Turbine Closed Cooling Water System by the following:

Objective:

The objective of this step is to ensure that cooling water for the instrument air compressors is aligned to the normal source of cooling.

Basis:

When turbine cooling water system is restored to normal lineup, the instrument air compressors are aligned to the normal source of cooling.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 56. Check AND continuously monitor Natural Circulation by ALL the following:

Objective:

The objective of this step is to check the conditions that indicate natural circulation flow exists.

Basis:

During cooldown and depressurization to shutdown cooling initiating conditions, indications of natural circulation has to be verified. When single phase circulation is established, the RCS indicates all of the following:

a) Loop ΔT (T_H-T_C) less than full power ΔT
b) Cold leg temperatures constant or dropping
c) Hot leg temperatures stable (i.e., not steadily rising) or dropping
d) No abnormal differences between T_H RTDs and core exit thermocouples. Hot leg RTD temperature should be consistent with the core exit thermocouples. Adequate natural circulation flow ensures that core exit thermocouples temperatures will be approximately equal to the hot leg RTDs temperature within the bounds of the instrument's inaccuracies. An abnormal difference between T_H and the CETs is greater then (10)°F.

If all RCP operation is terminated, and when inventory and pressure are controlled, then natural circulation is monitored by heat removal via both steam generators.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step 56 (continued).

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level and Table 5-3, Temperature.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 57. When a Steam Generator Low Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

The objective of this step is to prevent a main steam isolation signal from occurring and inhibiting cooldown.

Basis:

During a controlled cooldown and depressurization the automatic operation of certain safeguard systems is undesirable. Therefore, the MSIS setpoint must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 58. Commence Plant cooldown to obtain Cold Leg temperature of 350°F as follows:

Objective:

This step provides methods to continue the cooldown of the reactor coolant system to the shutdown coolant initiation conditions.

Basis:

An orderly cooldown and depressurization is resumed with the steam generator not isolated. These methods are presented in order, with the most preferred method listed first, to minimize radiological releases.

Operational Considerations:

Limit cooldown rate for reactor coolant system ≤50°F/hr. and for pressurizer ≤100°F/hr. During cooldown and depressurization maintain Subcooling Margin 28°F to 200°F. Refer to Attachment 1: Post-Accident Pressure and Temperature Limit Graph. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 59. When a Low Pressurizer Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

This step prevents a containment isolation or safety injection actuation signal from occurring.

Basis:

During a controlled cooldown and depressurization, the automatic operation of certain safeguard systems is undesirable. Therefore, the setpoint of CIAS and SIAS must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 60. Commence Plant depressurization to 375 psia using Pressurizer Auxiliary Spray as follows:

Objective:

The objective of this step is to depressurize the reactor coolant system to shutdown cooling entry conditions.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point when it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

During cooldown and depressurization, maintain subcooling margin 28°F to 200°F. Refer to Attachment 1: Post-Accident Pressure and Temperature Limit Graph.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 61. Monitor for Reactor Coolant System voiding as indicated by:

Objective:

This step provides guidance for detecting voids in the reactor coolant system.

Basis:

Since there are certain reactor coolant system conditions for which the presence of voids is acceptable, then voids are not a problem as long as the core and reactor coolant system heat removal and the reactor coolant system inventory safety functions are being satisfied. If these safety functions are not being satisfied or voiding is causing the reactor coolant system to remain pressurized above the shutdown cooling entry conditions, then this step will indicate voids. If voids are indicated, then step 62 will be performed.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 62. IF Reactor Coolant System voiding is indicated, THEN perform the following:

Objective:

This step provides methods to eliminate voids of the reactor coolant system.

Basis:

IF voiding was indicated in the previous step, THEN eliminate the voids if either of the following exists:

1. The following safety functions are NOT being satisfied:
   a. Core heat removal
   b. Reactor coolant system heat removal
   c. Reactor coolant system inventory

   OR

2. The Reactor coolant system remains pressurized above shutdown cooling entry conditions because of reactor coolant system voids present.

Operational Considerations:

If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper positions. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 63. WHEN using Emergency Feedwater to feed Steam Generators, perform the following:

Objective:

This step ensures continuous suction supply to emergency feed pumps.

Basis:

The available condensate inventory should be continually monitored and replenished from available sources as necessary to provide a source of a secondary heat sink.

Operational Considerations:

Obtain permission from control room supervisor prior to aligning auxiliary component cooling system to the emergency feedwater system.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameters Valve Document. Table 5-1, Level.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 64. When Pressurizer pressure is lowered to 650 psia, lower Safety Injection Tank pressure to between 300 psig AND 235 psig by operating the following SAFETY INJECTION TANKS vent valves:

Objective:

This step reduces safety injection tank pressure to prevent dumping tanks into the reactor coolant system.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point when it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 65. When Pressurizer pressure is <400 psia, place the RPS/ESFAS PZR PRESS BYPASS switch to "BYPASS" on ALL four channels of Plant Protection System.

Objective:

This step prevents SIAS and CIAS below minimum reset setpoint for low pressurizer pressure.

Basis:

During cooldown and depressurization, the automatic operation of certain safeguard systems is undesirable.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 66. When Pressurizer pressure is between 392 psia AND 350 psia, perform the following:

Objective:

This step isolates the safety injection tanks.

Basis:

The safety injection tanks should be isolated, vented, and drained at 250 psig to avoid introducing their nitrogen cover gas into the RCS and increasing the severity of the event.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 67. When the following conditions are established, maintain them as follows:

Objective:

This step establishes and maintains shutdown cooling entry conditions to provide a smooth transition into General Plant Operating Procedure.

Basis:

This activity places the plant in an operational mode where a complete cooldown and depressurization of the plant can take place.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions: Case II. Station Blackout

EOP Step Content:

Step 68. Record Pressurizer Spray Cycles.

Objective:

This step documents the number of spray cycles.

Basis: (Technical Specification 5.7)

The components identified in Table 5.7-1 are designed and shall be maintained within the cycle or transient limits of Table 5.7-1.

Operational Considerations:

The number of cycles is determined by comparing the Pressurizer pressure recorder to the time frame of the event.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. <u>Recovery Actions: Case II. Station Blackout</u>

EOP Step Content:

Step 69. Go to OP-10-001, GENERAL PLANT OPERATIONS, Section 6.9 <u>AND</u> continue cooldown as directed by the Control Room Super[illegible]or.

Objective:

The objective of this step is to exit the emergency procedures and enter normal plant operating procedures.

Basis:

This step allows operational personnel to continue operating or cooldown further in accordance with normal operating procedures rather than emergency procedures. This also serves to limit the length of emergency procedures.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

5.6.2 Guidelines for Safety Function Status Checklist

Safety Functions	Criteria	Bases
Reactivity Control	a. Reactor power dropping b. Negative SUR c. <10 CEAs NOT fully inserted d. For any CEA NOT fully inserted, Emergency Boration in progress OR has occurred.	For all emergency events, the reactor must be shutdown. The criterion of <10 CEAs NOT fully inserted in based on ATWS. The criterion that all CEAs fully inserted or emergency boration is in progress observes technical specification limits.
RCS Inventory Control	a. Pressurizer Level between 5% AND 40% b. RCS ≥28°F subcooled	(CEN-152, page 7-22) A value of 40% was chosen as an upper limit to prevent water from reaching the safeties and to account for instrument inaccuracies. A value of 5% was chosen as a lower limit to account for instrument inaccuracy. A 28°F subcooling margin co-existing with a pressurizer level between 5% to 40% indicates adequate RCS inventory control via a saturated bubble in the pressurizer.
RCS Pressure Control	a. Pressurizer pressure between 1450 psia AND 2300 psia	(Technical Guideline, Section 5.10, Parameter Values Document Table 5-4, Pressure) Parameter value is 1450-2300 psia pressurizer pressure. This is range of expected pressure excursion following a Station Blackout. Based on operational experience of similar NSSS System and engineering judgement.

Safety Functions	Criteria	Bases
RCS AND Core Heat Removal	a. CET temperatures satisfy BOTH of the following: 1) <800°F 2) NOT steadily rising for more than 15 minutes b. At least one Steam Generator is satisfying either: 1) Level is BOTH: a) >50% Wide Range b) Constant OR rising OR 2) Level is being restored by either MFW flow OR EFW flow c. $T_C \leq 550°F$.	Since the saturat_ temperature corresponding ' the RCS safety setpoints is less than 700°F, 800°F represents a superheat condition at high pressure in the RCS which can only occur with core uncovery. 800°F is a plant-specific temperature based on engineering judgement. Best estimate analyses have shown that 800°F CET temperature will not generally be exceeded without multiple equipment failures or coincident other accidents. The acceptance criteria that CET temperature not show an increasing trend for more than 15 minutes is based on analysis. CET temperature less than 800°F can result in significant fuel clad oxidation over extended time periods, i.e., 15 minutes. An increasing trend for a short period of time is possible and acceptable. (CEN-152, page 5-48) Decay heat levels may not be high enough to require feedwater flow of 150 gpm. If this is the case, once steam generator level is returned to the zero power level band and feedwater remains available to maintain that level, then RCS heat removal is being satisfied. 550°F is based on control program for Atmospheric Dump Valves and Steam Bypass Control Steam and best estimate analysis.

Safety Functions	Criteria	Bases
Containment Temperature AND Pressure Control	a. Contianment pressure <17.4 psia AND NO Containment Spray Actuation Signal.	(Technical Guideline, Section 5.10, Parameter Values Document, Table 5-4, Pressure) The value 17.4 psia is based on high containment pressure setpoint. For selected events it is not expected that containment pressure will increase to the setpoint.
Containment Isolation	a. NO steam plant activity	For selected events is is not expected that a steam plant activity will exists.
	b. NO Containment area radiation monitors alarming.	No radiation is anticipated in the containment for a degraded electrical distribution.
Containment Combustible Gas Control	a. Hydrogen concentration <0.5%.	Hydrogan concentration in the containment should not rise for a degraded electrical distribution.

5.6.4 List of Instruments and Ranges

Parameter and Ranges
for Degraded Electrical Distribution Recovery Procedure

Parameters	Required Range	Available Range
1. Pressurizer pressure	350 to 2250 psia	0 to 3000 psia
2. Pressurizer level	5 to 40%	0 to 100%
3. Pressurizer temperature	430 to 652°F	0 to 700°F
4. Average temperature	544 to 582°F	525 to 625°F
5. Cold leg temperature	350 to 550°F	0 to 600°F
6. Hot leg temperature	350 to 611°F	50 to 750°F
7. Core temperature	350 to 800°F	200 to 2300°F
8. Subcooling margin	28°F to 200°F	-200 to 200°F
9. Charging header flow	40 to 132 gpm	0 to 150 gpm
10. Steam generator pressure	67 to 1050 psia	0 to 1200 psia
11. Steam generator level		
a. Wide range	50 to 71%	0 to 100%
b. Narrow range	60 to 70%	0 to 100%
12. Steam flow	0 to 7.5 x 10^6 lbm/hr	0 to 8.0 x 10^6 lbm/hr
13. Feed flow	0 to 7.5 x 10^6 lbm/hr	0 to 8.0 x 10^6 lbm/hr
14. Emergency feedwater flow	0 to 400 gpm	0 to 800 gpm
15. Condensate storage pool level	27.7 to 97.7%	0 to 100%
16. High pressure turbine gland sealing steam (local)	1.5 to 3 psig	0 to 15 psig
17. Low pressure turbine gland sealing steam (local)	1.5 to 3 psig	-30 in Hg Vac to 15 psig
18. Main feed pump gland sealing steam (local)	4 psig	-30 in Hg Vac to 60 psig
19. [illegible]nd steam pressure	140 psig	0 to 150 psig
20. Containment pressure	0 to 17.4 psia	0 to 30 psia
21. Safety injection tank pressure	235 to 625 psig	0 to 700 psig

5.6.4 List of Instruments and Ranges

	Parameters	Required Range	Available Range
22.	Main condenser vacuum	0 to 30" Hg	0 to 30" Hg
23.	Emergency diesel generator megawatts	0 to 7 MW	0 to 7 MW
24.	Emergency diesel generator voltage	0 to 5250 volts	0 to 5250 volts
25.	4.16KV safety bus voltage	0 to 5250 volts	0 to 5250 volts
26.	4.16KV nonsafety bus voltage	0 to 5250 volts	0 to 5250 volts
27.	Battery bus voltage	0 to 150 volts	0 to 150 volts

Section 5.7:

Technical Guide for

Loss of Main Feedwater

Recovery Procedure

(OP-902-006)

5.7.1 Procedure Step Guidelines

E. Recovery Actions

EOP Step Content:

Step 1. Using the Plant Paging System, announce the following two times:

Objective:

The objective of this step is to inform plant personnel of the event.

Basis:

This step serves to gain additional support for the control room personnel and to ensure other site personnel are properly informed of the plant status.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOP Step Content:

Step 2. Advise the Shift Supervisor to implement EP-1, EMERGENCY PLAN.

Objective:

The objective of this step is to direct entry into the Emergency Plan for classification of the event and required notifications.

Basis:

This step ensures that action is taken to implement the Emergency Plan to gain additional support for the control room personnel and to ensure the safety of the site personnel and general public.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NUREG-0654, Appendix 1.

E. Recovery Actions

EOP Step Content:

Step 3. Refer to Foldout: Safety Function Status Checklist AND check ALL criteria are being maintained.

Objective:

This step verifies that all safety functions are being satisfied by comparing control board parameters to the criteria of the Safety Function Status Checklist.

Basis: (CEN-152, page 8-7, step 2)

Verify that all safety functions are being satisfied by comparing control board parameters to the criteria in Figure 8-11, Safety Function Status Check.

Operational Considerations:

When multiple indicators for one parameter exist, use more than one instrument to obtain a particular reading. The Safety Function Status Checklist shall be continuously monitored throughout the use of this procedure.

EPG Step Content: (CEN-152, page 9-29, step 2)

Verify that the safety functions are being satisfied by comparing control board parameters to the criteria in Figure 8-11 (Safety Function Status Check).

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 4. IF any criteria of the Foldout: Safety Function Status Checklist are NOT being satisfied, THEN go to OP-902-008, SAFETY FUNCTION RECOVERY PROCEDURE.

Objective:

The purpose of this step is to direct operator actions if the Steam Generator Tube Rupture Recovery Procedure is not adequately mitigating the event.

Basis: (CEN-152, page 8-8, step 3)

If a correct diagnosis is not confirmed, the operator is directed to implement the Functional Recovery Guideline. The Functional Recovery Guideline is functionally oriented and will ensure all safety functions are attended to regardless of what event(s) are occurring.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 8-29, step 3)

If all safety functions (Figure 8-11) are satisfied, then continue with the actions of this guideline. If not, implement the Functional Recovery Guideline.

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 5. IF either Main Feedwater pump is operating AND a steam flow/feed mismatch exists, THEN close BOTH MAIN FW ISOL VLVs:

Objective:

This step closes the Main Feedwater Isolation Valves if a feedwater line break is suspected.

Basis: (CEN-152, page 8-8, step 4)

If a main feedwater line break is suspected, the operator should try to isolate the feedwater line break from the steam generators by any plant-specific methods possible (i.e., closing main feedwater isolation valves, main feedwater regulating valves, etc.).

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 8-29, step 4)

Determine whether the cause of the loss of feedwater is result of a feedwater line break or a feedwater system abnormality by monitoring steam generator pressure and level. If a feedwater line break is suspected, attempt to isolate the break.

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 6. IF BOTH MAIN FW ISOL VLVs (FW 184A AND FW 184B) are closed, THEN verify BOTH Main Feed Pumps tripped AND associated valves close:

Objective:

This step secures the Main Feed pumps which are not necessary with both Main Feedwater isolation valves closed.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 7. IF a Feedwater line break, which can NOT be isolated, has occurred as indicated by dropping Steam Generator level or pressure, THEN go to OP-902-004, EXCESS STEAM DEMAND RECOVERY PROCEDURE.

Objective:

This step directs the operator to go to the Excess Steam Demand Recovery Procedure if a feedwater line break which cannot be isolated from the Steam Generator has occurred.

Basis: (CEN-152, page 8-8, step 4)

If the feedwater line cannot be isolated from the steam generator, it will continue to blowdown water until the steam generator boils dry. This results in an uncontrolled cooldown of the RCS. When the operator determines that a feedwater line break is unisolable, the Steam Line Break Recovery Guideline should be immediately followed for all further actions.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 8-29, step 4a)

If the feedwater line break is unisolable from the steam generator, exit this guideline and implement the Steam Line Break Recovery Guideline.

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 8. IF EFAS-1 OR EFAS-2 has occurred, THEN complete Attachment 6: EFAS-1 Automatic Actions OR Attachment 7: EFAS-2 Automatic Actions.

Objective:

This step has the operator verify automatic actions when an Emergency Feedwater Actuation Signal 1 OR 2 should occur.

Basis:

This step ensures all EFAS automatic actions occur.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOP Step Content:

Step 9. Verify Reactor Coolant System temperature is being controlled as follows:

Objective:

The objective of this step is to verify that the reactor coolant system temperature is being controlled at the desired value.

Basis:

Steam generator pressure should be controlled by the turbine bypass system at [900 psig] or less depending on current RCS temperature. The goal is to stabilize RCS temperature and remove decay heat. if condenser vacuum is lost, the turbine bypass system is not available, or if the MSIVs have closed, the atmospheric dump valves must be used to control steam generator pressure. This action is performed to maintain steam generator pressure below the secondary safety valve setpoints, preventing them from opening, and allow a controlled RCS heat removal process using the steam generators.

Operational Considerations:

If the automatic function is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

Verify turbine bypass valves are controlling steam generator pressure at [900 psig] or lower depending on RCS conditions. If condenser vacuum is lost or the turbine bypass system is unavailable, or if the MSIVs are closed, the atmospheric dump valves must be used to control steam generator pressure.

E. Recovery Actions

EOP Step 9 (continued).

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 10. When Pressurizer level is >28%, verify Pressurizer Pressure Control System is automatically maintaining OR restoring pressure at 2250 psia.

Objective:

This step verifies reactor coolant system pressure control when reactor coolant system inventory is restored.

Basis: (CEN-152, page 8-16, step 18)

The PPCS is verified to be automatically controlling or restoring RCS pressure within the limits of Figure 8-7.

Operational Considerations:

If the automatic function is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 8-32, step 18)

Verify that the PPCS is automatically maintaining or restoring RCS pressure within the limits of Figure 8-7. If not, manually control heaters or main spray (preferred) or auxiliary spray to restore pressurizer pressure.

Justification of Differences:

The EPG step deals only with pressure control. The safety function status checklist continuously monitors inventory control.

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline; Technical Guideline, Section 5.10, Parameter Values Document (Table 5-1, Level).

E. Recovery Actions

EOP Step Content:

Step 11. Verify the Pressurizer Level Control System is automatically maintaining OR restoring Pressurizer level at 33%.

Objective:

This step verifies the restoration of Pressurizer level by the Pressurizer Level Control System.

Basis: (CEN-152, page 8-16, step 19)

The PLCS is verified to be automatically controlling or restoring pressurizer level in the hot zero power reference band. If not, charging and letdown are operated manually to ensure pressurizer level is being maintained. This action verifies that the RCS inventory safety function is being controlled.

Operational Considerations:

If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper positions.

EPG Step Content: (CEN-152, page 8-32, step 19)

Verify that the PLCS is automatically maintaining or restoring pressurizer level in the hot zero power reference band. If not, manually operate charging and letdown to restore and maintain normal pressurizer level.

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 12. Maintain Steam Generator level with Emergency Feedwater between 68% to 71% Wide Range utilizing Emergency Feedwater.

Objective:

The objective of this step is to provide guidance for Steam Generator level control with Emergency Feedwater.

Basis: (CEN-152, page 8-31, step 16)

Steam generator level is controlled in the hot zero power band using [main or auxiliary] feedwater to provide for RCS heat removal.

Operational Considerations:

If the automatic function is not operating properly, then the system should be monitored for proper operation.

EPG Step Content: (CEN-152, page 8-31, step 16)

Continue to maintain or restore steam generator level in the hot zero power band using [main or auxiliary] feedwater.

Justification of Differences:

At this point in the procedure Main Feedwater is lost and Emergency Feedwater is supplying feedwater needs.

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 13. IF Main Feedwater is completely lost for $\geq$30 minutes, THEN stop ALL Reactor Coolant Pumps.

Objective:

This step secures the Reactor Coolant Pumps (a significant heat load) if Main Feedwater is completely lost.

Basis: (FASR, page 10.4.9B-2, step 10.4.9B.2.1 LMFW)

It is assumed that the operator will trip the Reactor Coolant Pumps (RCPs) 30 minutes after the reactor trip brought on by the LMFW. This is a required operating procedure action intended to reduce the heat load on the primary system. If both steam generators (SGs) are available, 450 gpm of EFS flow (225 per SG)* is needed to maintain the level required for the SGs to be adequate heat sinks. If only one SG is available, 400 gpm to that SG is adequate to maintain the level required for the SG to be an adequate heat sink (required EFS flow when one SG is available is less than for two SGs because of the RCS energy dissipated as the unfed SG boils away its inventory).

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Final Safety Analysis Report, Appendix 10.4.9.B, Emergency Feedwater Reliability Analysis.

E. Recovery Actions

EOP Step Content:

Step 14. IF NO Reactor Coolant Pumps are operating, THEN check Natural Circulation by ALL the following:

Objective:

The objective of this step is to check the conditions that indicate natural circulation flow exists.

Basis: (CEN-152, page 8-14, step 12)

When single phase circulation is established in at least one loop, the RCS indicates all of the following:

a) Loop ΔT (T_H-T_C) less than full power ΔT

b) Cold leg temperature constant or dropping

c) Hot leg temperatures stable (i.e., not steadily rising) or dropping

d) No abnormal differences between T_H RTDs and core exit thermocouples. Hot leg RTD temperature should be consistent with the core exit thermocouples. Adequate natural circulation flow ensures that core exit thermocouples temperatures will be approximately equal to the hot leg RTDs temperature within the bounds of the instrument's inaccuracies. An abnormal difference between T_H and the CETs is greater than (10)°F.

Operational Considerations:

This step need by performed only if all reactor coolant pumps have been stopped. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 8-31, step 12)

If all RCPs have been stopped, continually verify natural circulation flow in at least one loop. All of the following criteria must be met to demonstrate adequate natural circulation flow:

E. Recovery Actions

EOP Step 14 (continued).

Justification of Differences:

The EPG step was divided into two steps and expanded to include criteria for steam generator heat removal.

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline; Technical Guideline, Section 5.10, Parameter Values Document (Table 5-1, Level and Table 5-3, Temperature).

E. Recovery Actions

EOP Step Content:

Step 15. Stop ALL Heater Drain Pumps.

Objective:

This step secures heater drain pumps which are no longer required below 30% power.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 16. Verify ONE Condensate pump operating.

Objective:

This step directs the operator to verify at least one Condensate pump is operating, but no more.

Basis:

An operating Condensate pump provides for continuous recirculation of the Hotwell and cooling for the Gland Steam Condenser.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOP Step Content:

Step 17. Verify TURB & EXTR LINES DRAIN VALVES open.

Objective:

This step verifies the automatic opening of the turbine and extraction line drain valves.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. <u>Recovery Actions</u>

EOP Step Content:

Step 18. Verify following Turbine control switches in "AUTO":

Objective:

Verify turbine oil pumps and turning gear are ready for AUTO actuation.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 19. Start Auxiliary Boiler. Refer to OP-5-001, AUXILIARY BOILER, Section 6.3.

Objective:

The objective of this step is to start the auxiliary boiler to supply steam loads, and to permit removal of steam loads from the steam generators.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 20. When Neutron Flux Log Power is $\leq 10^{-4}\%$, THEN perform the following:

Objective:

This step directs the operator to observe automatic actions at $10^{-4}\%$ power and remove CPC trips.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 21. When NEUTRON FLUX LOG POWER (ENI-IJR-0001) is $\leq 10^{-6}$%, perform the following:

Objective:

The operator verifies automatic energization of startup channels and then adjusts the setpoint for both Boron Dilution Monitors.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS; CE Specification 9270-ICE-6618.

E. Recovery Actions

EOP Step Content:

Step 22. Transfer Gland Sealing Steam to Auxiliary Boiler as follows:

Objective:

The objective of this step is to transfer the steam load of gland sealing steam to the auxiliary boiler to remove steam loads from the steam generators.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 23. IF Main Feedwater system is determined to be operable, THEN restore Main Feedwater as follows:

Objective:

This step directs the operator actions for restoring Main Feedwater which is the preferred source of feedwater.

Basis: (CEN-152, page 8-9, step 7)

The operator should attempt to restore the correct operation of the [main or auxiliary] feedwater system by restoring electrical power, operating valves, starting pumps or restoring other important auxiliary systems in order to provide a primary decay heat sink for a controlled reactor cooldown.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 8-29, step 7)

Take actions to restore [main or auxiliary] feedwater system to operation.

Justification of Differences:

This procedure addresses a loss of Main Feedwater only. Emergency Feedwater will be in operation for this procedure.

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 24. IF Main Feedwater is feeding Steam Generator 1, THEN perform the following:

Objective:

This step resets EFAS-1 and aligns the Emergency Feedwater valves for Steam Generator 1 to a standby condition.

Basis:

With Main Feedwater feeding Steam Generator 1, Emergency Feedwater is not required for Steam Generator 1, EFAS-1 may be reset and associated Emergency Feedwater valves placed in standby alignment.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-9-003, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 25. IF Main Feedwater is feeding Steam Generator 2, THEN perform the following:

Objective:

This step resets EFAS-2 and aligns the Emergency Feedwater valves for Steam Generator 2 to a standby condition.

Basis:

With Main Feedwater feeding Steam Generator 2, Emergency Feedwater is not required for Steam Generator 2, EFAS-2 may be reset and associated Emergency Feedwater valves placed in standby alignment.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-9-003, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 26. IF EFAS-1 AND EFAS-2 have been reset AND Main Feedwater is feeding BOTH Steam Generators, THEN stop Emergency Feedwater pumps as follows:

Objective:

This step secures Emergency Feedwater pumps which are not necessary.

Basis:

With EFAS-1 and EFAS-2 reset and Main Feedwater supplying both Steam Generators, there is not a need to have Emergency Feedwater operating and the pumps may be restored to a standby lineup.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-9-003, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 27. IF Main Feedwater System is NOT immediately available, THEN evaluate Condensate Storage Pool inventory to determine when to commence plant cooldown. Refer to Attachment 3: Feedwater Capacity versus Time Remaining at Hot Standby, AND Attachment 4: Feedwater Required for a Cooldown to T_c (Required) versus T_c (Initial).

Objective:

The Control Room Supervisor determines the amount of water necessary for cooldown and time remaining before cooldown must be commenced.

Basis: (CEN-152, page 8-16, step 20)

The plant should be maintained in a stable condition based on auxiliary systems availability. One concern the operator must have is the remaining supply of feedwater. Condensate inventory adequacy is determined according to Figures 8-9 and 8-10. The operator will monitor required tank levels with the Plant Data Book.

Operational Considerations:

Without Main Feedwater, cooldown to shutdown cooling entry conditions must begin as soon as possible to ensure adequate inventory in the Condensate Storage Pool to avoid usage of Auxiliary Component Cooling water.

EPG Step Content: (CEN-152, page 8-32, step 20)

Maintain the plant in a stabilized condition and evaluate the need for a plant cooldown based on plant conditions, auxiliary systems availability and condensate inventory (Figures 8-9 and 8-10). If conditions require a cooldown, conduct a cooldown to SCS initiation conditions per normal operating instructions.

E. Recovery Actions

EOP Step 27 (continued).

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recov... uideline.

Plant Data Book.

E. Recovery Actions

EOP Step Content:

Step 28. IF ALL Reactor Coolant Pumps have been stopped AND Main Feedwater is supplying at least one Steam Generator, THEN check the following Reactor Coolant Pump restart criteria:

Objective:

This step provides guidelines for restoring Reactor Coolant Pumps to operation.

Basis: (CEN-152, page 8-11, step 11)

If RCP operation has been terminated, restarting of the reactor coolant pumps should be attempted if feedwater can be restored to at least one SG to ensure continued forced circulation of coolant through the core and to provide the capability for the normal mode of pressurizer spray.

Operational Considerations:

If Component Cooling Water to Reactor Coolant Pumps has been lost for $\geq$10 minutes, then Reactor Coolant Pumps should not be restarted.

EPG Step Content: (CEN-152, page 8-31, step 11)

If at any time the RCPs were stopped, one RCP in each loop may be restarted if all of the following criteria are satisfied:

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 29. IF ALL Reactor Coolant Pump restart criteria (Step 29) are satisfied, THEN restart one Reactor Coolant Pump in each loop. Refer to OP-1-00?, REACTOR COOLANT PUMP OPERATION, Section 4.0 AND 6.1.

Objective:

This step directs the operator to start one Reactor Coolant Pump in each loop if the guidelines for restart are satisfied.

Basis: (CEN-152, page 8-11, step 11)

If RCP operation has been terminated, restarting of the reactor coolant pumps should be attempted if feedwater can be restored to at least one SG to ensure continued forced circulation of coolant through the core and to provide the capability for the normal mode of pressurizer spray.

Operational Considerations:

If Component Cooling Water to Reactor Coolant Pumps has been lost for $\geq$10 minutes, then Reactor Coolant Pumps should not be restarted.

EPG Step Content: (CEN-152, page 8-31, step 11)

If at any time the RCPs were stopped, one RCP in each loop may be restarted if all of the following criteria are satisfied:

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 30. IF Reactor Coolant Pumps are operating, THEN verify Spray Valves selector switch is selected to the loop with the operating Reactor Coolant Pump.

Objective:

The objective of this step is to verify that normal spray is available.

Basis:

With forced circulation of coolant through the core, this action ensures that the normal mode of pressurizer spray is available.

Operational Considerations:

If the pressurizer auxiliary spray was being used, then charging shall be returned to normal lineup. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper positions.

EPG Step Content:

NA

Justification of Differences:

NA

Justification of Differences:

NA

E. Recovery Actions

EOP Step Content:

Step 31. Prior to Plant startup, complete OP-10-001, GENERAL PLANT OPERATIONS, Attachment 8.17: Post Reactor Trip Review.

Objective:

This step reminds the operator to complete the Post Reactor Trip Review as soon as possible. Therefore information concerning the Reactor Trip is recorded as soon as possible.

Basis:

The operator is directed to complete the Post Reactor Trip Review when either personnel are available or time is available. However, emphasis is placed on completing the Review as soon as possible.

Operational Considerations:

Prior to closing Reactor Trip Breakers, OP-10-001, GENERAL PLANT OPERATIONS, Attachment 8:17: Post Reactor Trip Review, shall be completed.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 32. IF Plant startup is planned AND ALL of the following conditions are satisfied, THEN go to OP-10-001, GENERAL PLANT OPERATIONS, Section 6.3.

Objective:

This step directs the operator to the startup section in OP-10-001, GENERAL PLANT OPERATIONS, and provides system parameters to be maintained.

Basis: (CEN-152, page 8-20, step 26)

The Plant should be maintained in a stable condition. Based on auxiliary systems availability and plant conditions, and, if feedwater is regained, condensate inventory, evaluate the need for a plant cooldown.

Operational Considerations:

Before startup can commence, the Post Reactor Trip Review must be completed. Main Feedwater must be available for startup.

EPG Step Content: (CEN-152, page 8-33, step 26)

Maintain the plant in a stabilized condition and evaluate the need for a plant cooldown based on plant conditions systems availability and, if feedwater is regained, condensate inventory (per Figures 8-9 and 8-10).

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 33. IF Plant Cooldown is planned AND BOTH of the following conditions are satisfied, THEN go to OP-10-001, GENERAL PLANT OPERATIONS, Section 6.8.

Objective:

This step directs the operator to the procedure for a normal cooldown with Main Feedwater available.

Basis: (CEN-152, page 8-20, step 26)

If required, conduct a plant cooldown within Technical Specification Limits and enter shutdown cooling.

Operational Considerations:

If Main Feedwater is not available, a cooldown must be done using the remainder of this procedure.

EPG Step Content: (CEN-152, page 8-33, step 26)

Maintain the plant in a stabilized condition and evaluate the need for a plant cooldown based on plant conditions systems availability and, if feedwater is regained, condensate inventory (per Figures 8-9 and 8-10). If required, conduct a plant cooldown within Technical Specification Limits and enter shutdown cooling.

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 34. IF using Emergency Feedwater to feed Steam Generators, THEN perform the following.

Objective:

This step ensures the operator verifies actuation of automatic makeup to CSP and a continued source of water to Emergency Feedwater System when Condensate Storage Pool level drops.

Basis:

1) When Condensate Storage Pool level drops to 97.7%, the automatic makeup valve should start opening.
2) When Condensate Storage Pool level drops to the CONDENSATE STORAGE POOL LO/LO LEVEL alarm, Auxiliary Component Cooling water is lined up to the Emergency Feedwater pump suction to ensure a source of water to the Emergency Feedwater pumps.

Operational Considerations:

1) Bypassing the Condensate Storage Pool makeup valve will require close monitoring the prevent overfill.
2) Control Room Supervisor permission is required prior to aligning Auxiliary Component Cooling water to the Emergency Feedwater system.
3) If the automatic action is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameter Values Document (Table 5-1, Level).

E. Recovery Actions

EOP Step Content:

Step 35. Stop BOTH CEDM Motor Generator sets. Refer to OP-4-004, CONTROL ELEMENT DRIVE, Section 6.2.

Objective:

This step secures the CEDM Motor Generator sets which are no longer requried.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 36. Direct Chemistry Department to sample Reactor Coolant System AND Pressurizer for boron concentration.

Objective:

This step has Chemistry Department verify boron concentration in both Pressurizer and Reactor Coolant System.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

This step will be performed again if the Reactor Coolant System must be borated.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 37. Verify Shutdown Margin in accordance with Technical Specifications. Refer to OP-903-090, SHUTDOWN MARGIN.

Objective:

The operator will determine adequate Shutdown Margin available for a cooldown to a Reactor Coolant System temperature <200°F.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

If Shutdown Margin is not adequate, the operator will borate as necessary.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 38. IF the difference between Reactor Coolant System AND Pressurizer boron concentration is >50 ppm, THEN equalize boron concentration.

Objective:

This step ensures the boron concentration in the Reactor Coolant System and the Pressurizer are equal and preclude a boron dilution incident due to Pressurizer outsurge into the Reactor Coolant System.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

This step requires a large amount of time even with four Reactor Coolant Pumps operating. When Reactor Coolant Pump Combination is reduced to one pump in each loop the time requirement will increase. With natural circulation, methods other than increasing spray flow may be necessary.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 39. IF Reactor Coolant Pumps are operating, THEN go to step 48.

Objective:

The objective of this step is to ensure the preferred method of cooldown is used if the reactor coolant pumps are available.

Basis:

When the reactor coolant pumps are operating, then this step directs the operator to step 43 to perform a forced circulation cooldown. Natural circulation is not as efficient as forced circulation for cooling the isolated steam generator; therefore, if possible, the forced circulation cooldown should be utilized.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOP Step Content:

Step 40. IF NO Reactor Coolant Pumps are operating, THEN check Natural Circulation by ALL the following:

Objective:

The objective of this step is to check the conditions that indicate natural circulation flow exists.

Basis: (CEN-152, page 8-14, step 12)

When single phase circulation is established in at least one loop, the RCS indicates all of the following:

a) Loop ΔT (T_H-T_C) less than full power ΔT

b) Cold leg temperatures constant or dropping

c) Hot leg temperatures stable (i.e., not steadily rising) or dropping

d) No abnormal differences between T_H RTDs and core exit thermocouples. Hot leg RTD temperature should be consistent with the core exit thermocouples. Adequate natural circulation flow ensures that core exit thermocouples temperatures will be approximately equal to the hot leg RTDs temperature within the bounds of the instrument's inaccuracies. An abnormal difference between T_H and the CETs is greater then (10)°F.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 8-31, step 12)

If all RCPs have been stopped, continually verify natural circulation flow in at least one loop. All of the following criteria must be met to demonstrate adequate natural circulation flow:

E. <u>Recovery Actions</u>

EOP Step 40 (continued).

Justification of Differences:

NA

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline; Technical Guideline, Section 5.10, Parameter Values Document (Table 5-1, Level and Table 5-3, Temperature).

E. Recovery Actions

EOP Step Content:

Step 41. When a Steam Generator Low Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

This step prevents a Main Steam Isolation Signal from occurring and inhibiting cooldown.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

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E. Recovery Actions

EOP Step Content:

Step 42. Commence a plant cooldown to obtain a Cold Leg temperature of 350°F by either of the following:

Objective:

This step starts the cooldown to Shutdown Cooling entry temperature.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 43. When a Low Pressurizer Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

This step prevents a Containment Isolation or Safety Injection from occurring.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 44. Commence Plant depressurization to 375 psia using Pressurizer Auxiliary Spray.

Objective:

The objective of this step is to depressurize the reactor coolant system to shutdown cooling entry conditions.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

During Plant cooldown and depressurization, maintain subcooling margin 28°F to 200°F. Refer to Attachment 1: Post-Accident Pressure and Temperature Limit Graph. Below 1000 psia, Subcooling Margin shall be determined by subtracting Hot Leg temperature from PRESSURIZER TEMPERATURE WATER (TI 101).

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 45. During Plant depressurization, monitor for Reactor Coolant System voiding as indicated by:

Objective:

This step provides guidance for detecting voids in the reactor coolant system.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOP Step Content:

Step 46. IF Reactor Coolant System voiding is indicated, THEN perform the following:

Objective:

This step provides methods to eliminate voids of the reactor coolant system.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper positions. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOP Step Content:

Step 47. IF ALL required actions of Natural Circulation cooldown (steps 40-46) were completed, THEN go to step 53.

Objective:

This step ensures that the operator continues this procedure to the shutdown cooling entry conditions.

Basis:

This step directs the operator to bypass the portion of this procedure which pertains to forced circulation cooldown. The remainder of this procedure would then be utilized to ensure that the shutdown cooling entry conditions are satisfied.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOF Step Content:

Step 48. When a Steam Generator Low Pressure Pretrip alarm occurs, reset the setpoint:

Objective:

This objective of this step is to prevent a main steam isolation signal from occurring and inhibiting cooldown.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 49. Commence a plant cooldown to obtain a Cold Leg temperature of 350°F by either of the following:

Objective:

This step starts the cooldown to Shutdown Cooling entry temperature.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 50. When a Low Pressurizer Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

The objective of this step is to prevent a containment isolation or safety injection from occurring.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 51. Commence Plant depressurization to 375 psia using Normal Spray.

Objective:

The objective of this step is to depressurize the RCS to shutdown cooling entry conditions.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

During Plant cooldown and depressurization, maintain Subcooling Margin 28°F to 200°F. Refer to Attachment 1: Post-Accident Pressure and Temperature Limit Graph. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 52. IF Feedwater AND Condensate systems can feed at least one Steam Generator AND Cold Leg temperature is $\leq$450°F, THEN perform the following:

Objective:

This step aligns Condensate and Feedwater systems for Condensate pump feed of the Steam Generators.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 53. IF Condensate OR Main Feedwater is feeding Steam Generator 1, THEN perform the following:

Objective:

This step secures Emergency Feedwater to Steam Generator 1 and aligns the associated Emergency Feedwater valves in a standby alignment.

Basis:

With Condensate feeding Steam Generator 1, EFAS-1 may be reset and the Emergency Feedwater valves for Steam Generator 1 placed in a standby alignment.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-9-003, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 54. IF Condensate OR Main Feedwater is feeding Steam Generator 2, THEN perform the following:

Objective:

This step secures Emergency Feedwater to Steam Generator 2 and aligns the associated Emergency Feedwater valves in a standby alignment.

Basis:

With Condensate feeding Steam Generator 2, EFAS-2 may be reset and the Emergency Feedwater valves for Steam Generator 2 placed in a standby alignment.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-9-003, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 55. IF EFAS-1 AND EFAS-2 have been reset AND Condensate System is feeding BOTH Steam Generators, THEN stop Emergency Feedwater pumps as follows:

Objective:

This step secures Emergency Feedwater pumps which are not necessary.

Basis:

With EFAS-1 and EFAS-2 reset and Condensate system supplying both Steam Generators, there is not a need to have Emergency Feedwater operating and the pumps may be restored to a standby alignment.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-9-003, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 56. When Pressurizer pressure drops to 1700 psia, locally open AND rack out the supply breaker for one operable High Pressure Safety Injection pump.

Objective:

This step has the operator remove one HPSI pump from service.

Basis:

1) To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.
2) Prevent overpressure condition at low temperature due to High Pressure Safety Injection pump flow.

Operational Considerations:

When multiple indicators for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 57. When Pressurizer pressure is lowered to 650 psia, lower Safety Injection Tank pressure to between 300 psig AND 235 psig by operating the following SAFETY INJECTION TANKS vent valves:

Objective:

This step reduces Safety Injection Tank pressure to prevent dumping tanks into the Reactor Coolant System.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 58. When Pressurizer pressure is <400 psia, place the RPS/ESFAS PZR PRESS BYPASS switch to "BYPASS" on ALL four channels of Plant Protection System.

Objective:

This step prevents SIAS and CIAS below minimum reset setpoint for Low Pressurizer Pressure.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 59. When Pressurizer pressure is between 392 psia AND 350 psia, perform the following:

Objective:

This step prevents unnecessary injection of Safety Injection Tank contents into the Reactor Coolant System.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 60. When the following conditions are established, maintain them as follows:

Objective:

This step directs the operator to attain the listed parameters.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

E. Recovery Actions

EOP Step Content:

Step 61. Record Pressurizer Spray Cycles.

Objective:

This step documents the number of Pressurizer spray cycles.

Basis: (Technical Specification 5.7)

The components identified in Table 5.7-1 are designed and shall be maintained within the cycle or transient limits of Table 5.7-1.

Operational Considerations:

The number of cycles is determined by comparing the Pressurizer pressure recorder to the time frame of the event.

EPG Step Content: (CEN-152, page 8-35, precaution 7)

Minimize the number of cycles of pressurizer auxiliary spray whenever the temperature differential between the spray water and the pressurizer is greater than [200°F] in order to minimize the increase in the spray nozzle thermal stress accumulation factor. Every such cycle must be recorded in accordance with Technical Specification limitations.

Justification of Differences:

The EPG precaution was made a step to ensure positive action by the operator.

Source Document:

CEN-152, Section 8.0, Loss of Feedwater Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 62. Go to OP-10-001, GENERAL PLANT OPERATIONS, Section 6.9 AND continue cooldown as directed by the Control Room Supervisor.

Objective:

The objective of this step is to exit the emergency procedures and enter normal plant operating procedures.

Basis:

This step allows operational personnel to continue operating or cooldown further in accordance with normal operating procedures rather than emergency procedures. This also serves to limit the length of emergency procedures.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, GENERAL PLANT OPERATIONS.

5.7.2 Guidelines for Safety Function Status Checklist

Safety Functions	Criteria	Bases
Reactivity Control	a. Reactor power dropping b. Negative SUR c. <10 CEAs NOT fully inserted d. For CEA NOT fully inserted, Emergency Boration in progress OR has occurred.	(CEN-152, page 8-22) For all emergency events, the reactor must be shutdown. The criterion of <10 CEAs NOT fully inserted is based on ATWS. The criterion that all CEAs fully inserted or emergency boration is in progress observes technical specification limits.
RCS Inventory Control	a. Pressurizer Level between 5% AND 40% b. RCS >28°F subcooled c. Pressurizer Level Control System functioning to maintain OR restore Pressurizer level.	(CEN-152, page 8-22) A value of 40% was chosen as an upper limit to prevent water from reaching the safeties and to account for instrument inaccuracies. A value of 5% was chosen as a lower limit to account for instrument inaccuracy A 28°F subcooling margin co-existing with a pressurizer level between 5" to 40" indicates adequate RCS inventory control via a saturated bubble in the pressurizer.
RCS Pressure Control	a. Pressurizer pressure between 1750 psia AND 2300 psia b. Pressurizer Pressure Control System functioning to maintain OR restore Pressurizer pressure.	Technical Guideline, Section 5.10, Parameter Values Document, (Table 5-4, Pressure). 1750-2300 psia pressurizer pressure is range of expected pressure excursion following uncomplicated Reactor Trip, based on operational experience of similar experience of similar NSSS System and engineering judgement.

5.7.2 Guidelines for Safety Function Status Checklist

Safety Functions	Criteria	Bases
RCS AND Core Heat Removal	a. CET temperatures satisfying BOTH of the following: 1) <800°F 2) NOT steadily rising for more than 15 minutes b. At least one Steam Generator is satisfying either: 1) Level is BOTH: a) >50% Wide Range b) Constant OR rising OR 2) Level is being restored by either Main OR Emergency Feedwater c. $T_C \leq 550°F$.	Since the Saturation Temperature corresponding to the RCS safety setpoints is less than 700°F, 800°F represents a superheat condition at high pressure in the RCS which can only occur with core uncovery. Core uncovery results from a loss of RCS inventory. While 800°F bounds all anticipated events, loss of Main Feedwater should result in no core uncovery and, therefore, no indicated superheat on the CETs. 800°f is a plant-specific temperature based on engineering judgement. Best estimate analysis have shown that 800°F CET temperature will not generally be exceeded without multiple equipment failures or coincident other accidents. The acceptance criteria that CET temperature not show an increasing trend for more than 15 minutes is based on analysis. CET temperature less than 800°F can result in significant fuel clad oxidation over extended time periods, i.e., 15 minutes. An increasing trend for a short period of time is possible and acceptable. When one steam generator level is returned to the zero power level band and feedwater remains available to maintain that level, then the SG contribution to RCS heat removal is being satisfied. (CEN-152, page 8-23) 550°F is based on control program for ADVs and steam generator dump bypass valves and best estimate analysis.

5.7.2 Guidelines for Safety Function Status Checklist

Safety Functions	Criteria	Bases
Containment Temperature AND Pressure Control	a. Containment pressure <17.4 psia AND NO Containment Spray Actuation Signal	17.4 psia is based on high containment pressure setpoint. It is not expected for selected events that containment pressure will increase to the setpoint.
Containment Isolation	a. NO Containment area radiation monitors alarming. b. NO Steam Plant radiation monitors alarming	No radiation is anticipated in the Containment for a Loss of Main Feedwater event. No radiation is anticipated in the steam plant for a Loss of Main Feedwater event.
Containment Combustible Gas Control	a. Hydrogen Concentration <0.5%	Hydrogen concentration in the containment should not rise for a Loss of Main Feedwater.
Vital Auxiliaries	a. BOTH of the following exist: 1) A AND B 6.9 KV busses energized 2) A AND B 4.16 KV non-safety busses energized b. A AND B 4.16 KV safety busses energized.	Having both A and B trains of non-safety busses energized ensures that all required auxiliaries are available and that the operator remains within the bounds of the Loss of Main Feedwater procedure which does not include degraded electrical distribution system.

5.7.3 Generic Steps Not Included in the Waterford-3 EOP

In the items cited below, step, precaution, and page numbers refer to the appropriate sections of CEN-152.

E. Recovery Actions

Step 8 (page 8-30):

[If the Auxiliary Feedwater System (AFW) is started, perform the following to prevent steam generator feedring damage:

Justification:

Due to Plant design this step is not required. In letter C-CE-8998, dated January 31, 1984, CE states the conditions necessary for water-hammer event do not exist at Waterford-3.

E. Recovery Actions

Step 9 (page 8-30):

If the SIS is operating, it may be throttled or stopped one train at a time if all of the following conditions are satisfied:

Justification:

This step is utilized for loss of inventory or for once-through cooling when all feedwater is lost. Waterford-3 does not have Power Operated Relief Valves (PORVs) and once-through cooling utilizing these valves cannot be done.

E. Recovery Actions

Step 10 (page 8-30):

If all the criteria of step 9 cannot be maintained after the SIS has been stopped, the SIS must be restarted.

Justification:

This step is a followup to step 9 which is not used.

E. Recovery Actions

Step 21 (page 8-32):

If all feedwater (main and auxiliary) is lost, conduct the following activities:

Justification:

This step, which is a portion of steps 21-26, utilizes once-through cooling with PORVs. Waterford-3 does not have PORVs and this step does not apply.

E. Recovery Actions

Step 22 (page 8-33):

[If feed to at least one steam generator cannot be restored, establish once through cooling by:]

Justification:

This step, which is a portion of steps 21-26, utilizes once-through cooling with PORVs. Waterford-3 does not have PORVs and this step does not apply.

E. Recovery Actions

Step 23 (page 8-33):

[If other methods are available for heat removal from the RCS, insert that information here.]

Justification:

This step, which is a portion of steps 21-26, utilizes once-through cooling with PORVs. Waterford-3 does not have PORVs and this step does not apply.

E. Recovery Actions

Step 24 (page 8-33):

If feedwater is regained, use either bypass or atmospheric dump valves to dump steam. Stop once-through-cooling if in use.

Justification:

This step, which is a portion of steps 21-26, utilizes once-through cooling with PORVs. Waterford-3 does not have PORVs and this step does not apply.

E. Recovery Actions

Step 25 (page 8-33):

Throughout the event attempt to maintain the RCS within the acceptable Post/Accident Pressure/Temperature Limits of Figure 8-7 by using the following:

Justification:

This step, which is a portion of steps 21-26, utilizes once-through cooling with PORVs. Waterford-3 does not have PORVs and this step does not apply.

E. Recovery Actions

Step 26 (page 8-33):

Maintain the plant in a stabilized condition and evaluate the need for a plant cooldown based on plant conditions, systems availability and, if feedwater is regained, condensate inventory (per Figures 8-9 and 8-10).

Justification:

This step, which is a portion of steps 21-26, utilizes once-through cooling with PORVs. Waterford-3 does not have PORVs and this step does not apply.

E. Recovery Actions

Precaution 1 (page 8-34):

The operator should not add feedwater to dry steam generator if another steam generator still contains water. Re-establish feedwater only to the steam generator that is not dry. If both steam generators become dry, refill only one steam generator to reinitiate core cooling.

Justification:

The occurrence of a dry Steam Generator would require multiple failures which is not covered in this procedure.

E. Recovery Actions

Precaution 6 (page 8-34):

Solid water operation of the pressurizer should be avoided unless [20°F] of subcooling cannot be maintained in the RCS (Figure 8-7). If the RCS is solid, closely monitor any makeup or draining and any steam heatup or cooldown to avoid any unfavorable rapid pressure excursions.

Justification:

This step applies to operation of Safety Injection for once-through cooling which is not covered in this procedure.

E. Recovery Actions

Precaution 8 (page 8-35):

[Monitor quench tank parameters since any sustained operation of the PORVs may burst the tank's rupture disc.]

Justification:

Waterford-3 does not have Power Operated Relief Valves.

E. Recovery Actions

Figure 8-8 (page 8-37):

Minimum Acceptable SIS Flos vs RCS Pressure Injection Mode.

Justification:

This figure applies to Safety Injection flow which is not used in this procedure.

5.7.4 List of Instruments and Ranges

Parameter and Ranges

Loss of Main Feedwater Recovery Procedure

Parameters	Required Range	Available Range
1. Pressurizer pressure	350 to 2365 psia	0 to 3000 psia
2. Pressurizer level	5 to 40%	0 to 100%
3. Pressurizer temperature	430 to 652°F	0 to 700°F
4. Average temperature	544 to 582°F	525 to 625°F
5. Cold leg temperature	350 to 550°F	0 to 600°F
6. Hot leg temperature	350 to 611°F	50 to 750°F
7. Subcooling margin	28 to 200°F	-200 to 200°F
8. Steam generator pressure	67 to 1050 psia	0 to 1200 psia
9. Steam generator level		
a. Wide range	50 to 71%	0 to 100%
b. Narrow range	60 to 70%	0 to 100%
10. Condensate storage pool level	27.7 to 97.7%	0 to 100%
11. Steam flow	0 to 7.5 x 10^6 lbm/hr	0 to 8 x 10^6 lbm/hr
12. Feed flow	0 to 7.5 x 10^6 lbm/hr	0 to 8 x 10^6 lbm/hr
13. Emergency feedwater flow	0 to 400 gpm	0 to 800 gpm
14. High pressure turbine gland sealing steam (local)	1.5 to 3 psig	0 to 15 psig
15. Low pressure turbine gland sealing steam (local)	1.5 to 3 psig	-30 in Hg Vac to 15 psig
16. Main feed pump gland sealing steam (local)	4 psig	-30 in Hg Vac to 60 psig
17. Gland steam pressure	140 psig	0 to 150 psig
18. Containment pressure	0 to 17.4 psig	0 to 30 psig
19. Safety injection tank pressure	235 to 625 psig	0 to 700 psig

Section 5.8:

Technical Guide for

Steam Generator Tube Rupture

(OP-902-007)

5.8.1 Procedure Step Guidelines

E. Recovery Actions

EOP Step Content:

Step 1. Refer to Attachment 1: Break Identification Chart, to confirm that a Steam Generator Tube Rupture is in progress.

Objective:

The objective of this step is to verify that the proper procedure is being used to mitigate the effects of a steam generator tube rupture and all safety functions are being satisfied.

Basis: (CEN-152, page 6-9)

This step verifies that the diagnosis was correct. A different event with similar initial symptoms could be mistaken for the steam generator tube rupture early in the event; this chart confirms that the event was properly identified.

Operational Considerations:

This step needs to be performed at this time to eliminate the possibility of an incorrect procedure being used. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-42, step 2)

Confirm the diagnosis of a Steam Generator Tube Rupture by referring to the Break Identification Chart (Figure 6-8), and verify that the safety functions are being satisfied by comparing control board parameters to the criteria in Figure 6-9.

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 2. IF Attachment 1: Break Identification Chart, does NOT confirm a Steam Generator Tube Rupture, THEN go to OP-902-000, EMERGENCY ENTRY PROCEDURE, Section D.

Objective:

The objective of this step is to direct the operator to the Diagnosis Section of OP-902-000, Emergency Entry Procedure, when it is determined that the operator has selected an incorrect procedure.

Basis:

In referring the operator OP-902-000, Emergency Entry Procedure, this step provides guidance to the operator in diagnosing an event; only in the Emergency Entry Procecure is the diagnosis of events allowed.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-42, step 3)

If the Break Identification Chart (Figure 6-8) indicates that a LOCA or SLB has occurred, exit the SGTR Guideline and implement the actions of the SLB or LOCA Guideline.

Justification of Differences:

The EOP step directs the operator to the Emergency Entry Procedure since diagnosis of events is performed only in this procedure.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 3. Using the Plant Paging System, announce the following two times:

Objective:

The objective of this step is to inform plant personnel of the event.

Basis:

This step serves to gain additional support for the control room personnel and to ensure other site personnel are properly informed of the plant status.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOP Step Content:

Step 4. Advise the Shift Supervisor to implement EP-1, EMERGENCY PLAN.

Objective:

The objective of this step is to direct entry into the Emergency Plan for classification of the event and required notifications.

Basis:

This step ensures that action is taken to implement the Emergency Plan to gain additional support for the control room personnel and to ensure the safety of the site personnel and general public.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NUREG-0654, Appendix 1.

E. Recovery Actions

EOP Step Content:

Step 5. Refer to Foldout: Safety Function Status Checklist AND check ALL criteria are being maintained.

Objective:

This step verifies that all safety functions are being satisfied by comparing control board parameters to the criteria of the Safety Function Status Checklist.

Basis: (CEN-152, page 6-10)

This step ensures that all relevant safety functions are being satisfied and that the core is being adequately cooled.

Operational Considerations:

When multiple indicators for one parameter exist, use more than one instrument to obtain a particular reading. The Safety Function Status Checklist shall be continuously monitored throughout the use of this procedure.

EPG Step Content: (CEN-152, page 6-42, step 5)

Continually verify that the safety functions are being satisfied by comparing control board parameters to the criteria in Figure 6-9.

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 6. IF any criteria of the Foldout: Safety Function Status Checklist are NOT being satisfied, THEN go to OP-902-008, SAFETY FUNCTION RECOVERY PROCEDURE.

Objective:

The purpose of this step is to direct operator actions if the Steam Generator Tube Rupture Recovery Procedure is not adequately mitigating the event.

Basis: (CEN-152, page 6-10, step 6)

If the safety functions are not being satisfied, then the operator is required to leave the SGTR procedure and implement the Safety Function Recovery Procedure. This procedure is functionally oriented and will ensure all safety functions are attended to regardless of what event(s) are occurring.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-42, step 6)

If the safety functions from Figure 6-9 are satisfied, then continue with the actions of this guidelines. If not, implement the SAFETY FUNCTION RECOVERY PROCEDURE.

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 7. Verify Condenser Vacuum Pump exhaust diverts to the Plant Stack filters as follows:

Objective:

The objective of this step is to stop an unfiltered radioactive release from the condenser vacuum pumps exhaust.

Basis:

This step aligns the exhaust from the vacuum pumps to the reactor auxiliary building normal exhaust filter train to minimize the radioactive release to site personnel and the general public.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

FSAR, Section 10.4.2.2.

E. Recovery Actions

EOP Step Content:

Step 8. IF either of the following conditions occurs, THEN stop ALL Reactor Coolant Pumps:

Objective:

The objective of this step is to stop reactor coolant pump operation when ≤1621 psia following a SIAS or when component cooling water is lost.

Basis: (CEN-152, page 6-13, step 13)

This step serves to prevent continued RCP operation when RCS pressure is ≤1621 psia during a Loss of Coolant Accident. Continued RCP operation at RCS pressures below 1621 psia during a Loss of Coolant Accident may result in more severe RCS conditions. When component cooling water is lost to the reactor coolant pumps, damage to pump components could occur if the RCPs are not secured.

Operational Considerations:

Since other events could cause rapid depressurization, anytime pressurizer pressure drops below 1621 psia following a SIAS, all RCP operation is terminated. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-44, step 13)

If pressurizer pressure decreases to (1300 psia) following an SIAS, stop all reactor coolant pumps.

Justification of Differences:

Loss of Component Cooling Water to Reactor Coolant Pumps is added to this step because CCW is isolated to RCPs as a SIAS actuation.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-4, Pressure.

E. Recovery Actions

EOP Step Content:

Step 9. IF any of the following occur, THEN complete associated attachment:

Objective:

The objective of this step is to verify all actions required by any automatic actuated signal have occurred.

Basis:

Due to the number of valves, pumps, fans, and other equipment actuated by automatic safety signals, the verification is done by use of a checklist. The actuation signals are verified in immediate actions only so far as to encure the actuation signal is valid. This step verifies all component actions required by SIAS, CIAS, EFAS-1, and EFAS-2.

Operational Considerations:

This step should be performed concurrently with this procedure and preferably by an operator not required for other duties.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

NA

E. Recovery Actions

EOP Step Content:

Step 10. Verify Reactor Coolant System temperature is being controlled as follows:

Objective:

The objective of this step is to verify that the reactor coolant system temperature is being controlled at the desired value.

Basis: (CEN-152, page 6-10, step 7)

Reactor coolant system temperature is controlled at $\leq$550°F so that the reactor coolant system heat inventory is not sufficient to cause steam generator safety valves to lift. The steam bypass control system is the preferred means for control of steam generator pressure because the atmospheric dump valves would allow an unmonitored radioactive release to the environment.

Justification of Differences:

This step is performed before the leaking steam generator has been identified and isolated to prevent the steam generator safety valves from lifting. If the condenser is available, then by using the steam bypass control system, a closed system is maintained. If the automatic function is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-42, step 7)

To minimize the potential of lifting steam generator safeties after isolating a steam generator, verify tht the RCS hot leg temperature is less than (545°F). If the RCS hot leg temperature is greater than (545°F), cool down the RCS by performing one of the following. The activities are listed in order of preference:

E. Recovery Actions

EOP Step 10 (continued).

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5.3, Temperature

E. Recovery Actions

EOP Step Content:

Step 11. Determine the Steam Generator to be isolated by one OR more of the following:

Objective:

The objective of this step is to ensure that the steam generator with the higher activity is determined prior to further cooldown and steam generator isolation.

Basis: (CEN-152, page 6-11, step 8)

This action identifies the steam generator that is in jeopardy or has to be isolated due to higher activity. This step will provide information to the operator so containment integrity can be assured in the following steps of this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. The blowdown radiation monitor will indicate only on the steam generator to which it is selected. Automatic feedwater modulations may mask the expected steam generator level rise due to a steam generator tube rupture. If both steam generators have a tube rupture, then the one with the higher radiation levels shall be selected for isolation.

EPG Step Content: (CEN-152, page 6-43, step 8)

Determine which Steam Generator has the tube rupture by performing the following:

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 12. Open CNTMT ISOLATION INSTRUMENT AIR (IA 908) valve.

Objective:

The objective of this step is to verify that instrument air is available to containment.

Basis:

If instrument air is isolated from containment, then realignment is necessary for operation of pneumatically operated valves.

Operational Considerations:

N/A

EPG Step Content:

N/A

Justification of Differences:

NA

Source Document:

N/A

E. Recovery Actions

EOP Step Content:

Step 13. Isolate selected Steam Generator as follows:

Objective:

The objective of this step is to isolate the steam generator with the tube rupture.

Basis: (CEN-152, page 6-11)

The steam generator with higher activity, higher radiation levels, or rising water level should be isolated. Isolating the steam generator is an attempt to reestablish the containment integrity.

Operational Considerations:

If a tube rupture is indicated in both steam generators, then both steam supplies to the A/B EFW pump may be isolated.

EPG Step Content: (CEN-152, page 6-43, step 9)

Isolate the steam generator with higher activity, higher radiation levels, or increasing water level by performing all of the following:

Justification of Differences:

N/A

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 14. Check the correct Steam Generator is isolated by performing the following:

Objective:

The objective of this step is to verify that the correct steam generator is isolated.

Basis: (CEN-152, page 6-12, step 10)

Isolation of the correct steam generator should be verified by sampling, radiation levels, and changes in steam generator level. This provides feedback that the proper steam generator has been isolated.

Operational Considerations:

If a tube rupture is indicated in both steam generators, then the control room supervisor should be cautious in determining the correct steam generator.

EPG Step Content: (CEN-152, page 6-43, step 10)

Once the affected steam generator has been isolated, verify the correct S/G isolated by checking radiation indications, and possible steam generator level increase, and by sampling techniques.

Justification of Differences:

N/A

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 15. IF determined by step 14 that the incorrect Steam Generator was isolated, THEN perform the following:

Objective:

The objective of this step is to isolate the correct steam generator.

Basis: (CEN-152, page 6-12, step 11)

If the wrong steam generator has been isolated or confirmed by the previous step, it should be realigned and the affected steam generator should be isolated.

Operational Considerations:

If a tube rupture is indicated in both steam generators, then the control room supervisor should be cautious when realigning the steam generator which was isolated.

EPG Step Content: (CEN-152, page 6-43, step 11)

If the wrong steam generator has been isolated, unisolate that generator and isolate the affected steam generator.

Justification of Differences:

N/A

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 16. IF ALL Reactor Coolant Pumps have been stopped, THEN check the following Reactor Coolant Pump restart criteria:

Objective:

The objective of this step is to ensure the reactor coolant system employs the preferred means of coolant circulation.

Basis: (CEN-152, page 6-13, step 14)

A forced circulation cooldown is preferred to a natural circulation cooldown whenever possible during a recovery from a steam generator tube rupture. By using forced circulation, this action enhances the strategy to obtain an uncomplicated cooldown.

Operational Considerations:

If component cooling water to RCPs has been lost for $\geq$10 minutes, then RCPs should not be restarted. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-44, step 14)

Forced circulation is the preferred method to circulate reactor coolant. If the RCPs were stopped, one RCP in each loop should be restarted if all of the following criteria are satisfied:

Justification of Differences:

This EPG step was divided into three different EOP steps so that the plant specific instructions could be given.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level and Table 5-2, Subcooling.

E. Recovery Actions

EOP Step Content:

Step 17. IF ALL Reactor Coolant Pump restart criteria (step 13) are satisfied, THEN restart one Reactor Coolant Pump in each loop. Refer to OP-1-002, REACTOR COOLANT PUMP OPERATION, Sections 4.0 AND 6.1.

Objective:

The objective of this step is to ensure the reactor coolant system employs the preferred means of coolant circulation.

Basis: (CEN-152, page 6-13, step 14)

If forced circulation is possible by starting RCPs, then only one reactor coolant pump in each loop should be operated in an effort to minimize heat input to the reactor coolant system.

Operational Considerations:

If component cooling water to RCPs has been lost for ≥10 minutes, then RCPs should not be restarted.

EPG Step Content: (CEN-152, page 6-44, step 14)

Forced circulation is the preferred method to circulate reactor coolant. If the RCPs were stopped, one RCP in each loop should be restarted if all of the following criteria are satisfied:

Justification of Differences:

This EPG step was divided into three different EOP steps so that the plant specific instructions could be given.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 18. IF Reactor Coolant Pumps are operating, THEN verify Spray Valves Selector Switch is selected to the loop with the operating Reactor Coolant Pump.

Objective:

The objective of this step is to verify that normal spray is available.

Basis: (CEN-152, page 6-13, step 14)

With forced circulation of coolant through the core, this action ensures that the normal mode of pressurizer spray is available.

Operational Considerations:

If the pressurizer auxiliary spray was being used, then charging shall be returned to normal lineup. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 6-51, Precautions, 11)

If restarting reactor coolant pumps, consideration should be given to choosing pump combinations which will maximize pressurizer spray flow.

Justification of Differences:

This EPG precaution was made a step in the EOP to make it a positive action and thereby ensure normal spray is utilized.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 19. IF Pressurizer level is >28%, THEN verify Pressurizer pressure is being restored by Pressurizer heaters.

Objective:

This step verifies reactor coolant system pressure control when reactor coolant system inventory is restored.

Basis: (CEN-152, page 6-14)

By ensuring pressure control, limits will be maintained on the post accident pressure and temperature limits graph.

Operational Considerations:

If the automatic function is not operating properly, then systems should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 6-44, step 15)

If all RCPs have been stopped, inventory and pressure are being controlled, and the steam generators are being used for heat removal, natural circulation flow is maintained in at least one loop. All of the following must be met to demonstrate adequate natural circulation flow:

Justification of Differences:

The EPG step deals only with pressure control. The safety function status checklist continuously monitors inventory control.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level.

E. Recovery Actions

EOP Step Content:

Step 20. IF NO Reactor Coolant Pumps are operating, THEN check Natural Circulation by ALL the following:

Objective:

The objective of this step is to check the conditions that indicate natural ciruculation flow exists.

Basis: (CEN-152, page 6-16 and 6-14)

When single phase circulation is established in at least one loop, the RCS indicates all of the following:

a) Loop ΔT (T_H-T_C) less than full power ΔT

b) Cold leg temperatures constant or dropping

c) Hot leg temperatures stable (i.e., not steadily rising) or dropping

d) No abnormal differences between T_H RTDs and core exit thermocouples. Hot leg RTD temperature should be consistent with the core exit thermocouples. Adequate natural circulation flow ensures that core exit thermocouples temperatures will be approximately equal to the hot leg RTDs temperature within the bounds of the instrument's inaccuracies. An abnormal difference between T_H and the CETs is greater than (10)°F.

If all RCP operation is terminated, and when inventory and pressure are controlled, then natural circulation is monitored by heat removal via at least one steam generator.

Operational Considerations:

This step need be performed only if all reactor coolant pumps have been stopped. Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

E. Recovery Actions

EOP Step 20 (continued).

EPG Step Content: (CEN-152, page 6-44, step 15)

If all RCPs have been stopped, inventory and pressure are being controlled, and the steam generators are being used for heat removal, natural circulation flow is maintained in at least one loop. All of the following criteria must be met to demonstrate adequate natural circulation flow:

Justification of Differences:

The EPG step was divided into two steps and expanded to include criteria for steam generator heat removal.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level and Table 5-3, Temperature.

E. Recovery Actions

EOP Step Content:

Step 21. Trip one Main Feed Pump AND verify the associated valves close:

Objective:

This step secures one of the two main feed pumps since only one is required below 50% power.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 22. Stop ALL Heater Drain Pumps.

Objective:

This step secures heater drain pumps which are no longer required below 30% power.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 23. Align the Condensate Pumps as follows:

Objective:

This step secures all condensate pumps which are not required to support the running main feed pump logic.

Basis:

To exit this procedure under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must first be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 24. When a Steam Generator Low Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

This step prevents a main steam isolation signal from occurring and inhibiting cooldown.

Basis: (CEN-152, page 6-29)

During a controlled coodown and depressurization, the automatic operation of certain safeguard systems is undesirable. Therefore, the setpoint of MSIS must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-48, step 35)

If plant conditions permit, bypass automatic initiation of (MSIS, CIAS and SIAS by lowering the setpoint as the cooldown and depressurization proceeds).

Justification of Differences:

This step was divided up since MSIS applies to cooldown of RCS, while CIAS and SIAS apply to depressurization of RCS.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 25. Commence a Plant cooldown to obtain Hot Leg temperature of 500°F for the loop with the Steam Generator which is NOT isolated by EITHER of the following:

Objective:

This step ensures cooldown prior to depressurization so that 50°F subcooling is maintained.

Basis:

This step is done to ensure that during the plant depressurization 28°F subcooling will be maintained. The 500°F will actually provide 45°F subcooling at 1000 psia. This provides additional margin during the transient condition. The hot leg temperature of 500°F also considers core uplift when all reactor coolant pumps are operating.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

Technical Guideline, Section 5.10, Parameter Values Document. Table 5-3, Temperature.

E. Recovery Actions

EOP Step Content:

Step 26. Direct Chemistry Department to sample the following:

Objective:

This step obtains activity levels of reactor coolant and secondary coolant for leak determination and radioactive release assessment. Boron concentration is sampled to check for shutdown margin as per technical specifications.

Basis: (CEN-152, page 6-23)

These samples serve as aids to identify the shutdown margin, and to determine whether the pressurizer boron concentration is equalized with that of the reactor coolant system. The secondary samples provide data for offsite dose calculations.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-46 and 6-47, step 22 and 25)

Sample the RCS for radioactivity and boron concentration. Calculate and add sufficient boron to the RCS to raise the entire RCS (including the mass in the pressurizer) to the shutdown margin required by Technical Specifications. Sample the condensate and other connecting systems, including turbine building sumps, for activity which may have been transferred from the affected steam generator.

Justification of Differences:

These two EPG steps were combined in this EOP step due to the time frame in the procedure; the control room operator would have to direct chemistry only once.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 27. Direct Health Physics Department to conduct radiation surveys in the Turbine Building.

Objective:

The objective of this step is to determine the radiation levels in the turbine building.

Basis:

Radiation surveys are necessary in the turbine building to ensure that plant personnel are not exceeding any exposure limits, and to help determine the extent of contamination. The surveys provide data for offsite dose calculations.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-47, step 26)

Continually observe the (turbine) and (auxiliary) building ventilation systems' radiation monitors and any other applicable radiation monitors. Take corrective actions, if necessary, in accordance with plant Technical Specification Limitations.

Justification of Differences:

Health Physics surveys are performed instead of monitoring turbine building ventilation because of plant specific design characteristics.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 28. When Hot Leg temperature is 500°F for the loop with the Steam Generator which is NOT isolated, depressurize the Reactor Coolant System to 1000 psia as follows:

Objective:

This step depressurizes the RCS to 1000 psia to reduce the reactor coolant leakage into the steam generator.

Basis: (CEN-152, page 6-24)

The general goals associated with RCS pressure control are providing subcooling to support the core heat removal process, avoiding overpressure situations for PTS and RT_{NDT} considerations, minimizing the pressure differential between the steam generator and the RCS to minimize the leakage and control RCS pressure so that it is below the steam generator safety valve setpoints.

Operational Considerations:

Controlled depressurization below 1621 psia does not require stopping reactor coolant pumps. Pressurizer level anomalies during controlled depressurization to 1000 psia may be tolerated. Below 1000 psia, subcooling margin shall be determined by subtracting hot leg temperature from PRESSURIZER TEMPERATURE WATER (TI 101).

EPG Step Content: (CEN-152, page 6-46, step 23)

Decrease and then control RCS pressure slightly above the affected steam generator pressure and below (1000 psig) using the following methods (listed in order of preference). Throughout the event, including cooldown, maintain the RCS within acceptable Post-Accident Pressure/Temperature Limits of Figure 6-10.

E. Recovery Actions

EOP Step 28 (continued)

Justification of Differences:

Depressurization is performed to 1000 psia since this is the level at which the steam generator pressure is being controlled. The post-accident pressure/temperature limits are not mentioned in the EOP step. They are instead mentioned in a caution prior to plant cooldown and depressurization to shutdown cooling entry conditions.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-3, Temperature.

E. Recovery Actions

EOP Step Content:

Step 29. During Plant depressurization, monitor for Reactor Coolant System voiding as indicated by:

Objective:

This step provides guidance for detecting voids in the reactor coolant system.

Basis: (CEN-152, page 6-21, step 20)

Since there are certain reactor coolant system conditions for which the presence of voids is acceptable, then voids are not a problem as long as the core and reactor coolant system heat removal and the reactor coolant system inventory safety functions are being satisfied. If these safety functions are not being satisfied or voiding is causing the reactor coolant system to remain pressurized above 1000 psia then this step will indicate voids. If voids are indicated, then step 30 will be performed.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-46, step 20)

Monitor for RCS voiding. indications of voiding are any of the following parameter changes or trends:

Justification of Differences:

N/A

Source Document:

CFN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 30. IF Reactor Coolant System voiding is indicated, THEN perform the following:

Objective:

This step provides methods to eliminate voids of the reactor coolant system.

Basis: (CEN-152, page 6-23, step 21)

IF voiding was indicated in the previous step, THEN eliminate the voids if either of the following exists:

1. The following safety functions are NOT being satisfied:
   a. Core heat removal
   b. Reactor coolant system heat removal
   c. Reactor coolant system inventory

OR

2. The Reactor coolant system remains pressurized above shutdown cooling entry conditions because of reactor coolant system voids present.

Operational Considerations:

If the automatic functionis not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper positions. Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-46, step 21)

Void elimination is performed as follows:

Justification of Differences:

N/A

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 31. Check the following Safety Injection termination criteria:

Objective:

The step evaluates certain criteria associated with terminating safety injection flc

Basis: (CEN-152, page 6-17)

If an SIAS has been initiated and the SIS is operating it must continue to operate at full capacity until SIS termination criteria are met. Early termination may be desirable when the criteria are met to preclude PTS situations or HPSI pump damage (e.g., shaft seals).

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-45, step 16)

If the SIS is operating, it may be throttled or stopped one train at a time if all of the following conditions are satisfied:

Justification of Differences:

The EPG step was divided into two steps, one step covering termination criteria and the other covering termination direction.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level and Table 5-2, Subcooling.

E. Recovery Actions

EOP Step Content:

Step 32. IF ALL Safety Injection termination criteria (step 31) are satisfied, THEN throttle OR stop Safety Injection FLOW one train at a time AND stop Charging Pumps as necessary to control Pressurizer level 33% to 60%.

Objective:

The step maintains pressurizer level and prevents solid water operation.

Basis: (CEN-152, page 6-18 and 6-17)

If the criteria are all met, the operator may either terminate or throttle the SIS. The operator may decide to throttle rather than terminate if SIS is to be used to control pressurizer level or plant pressure. Termination of SIS should be sequenced by stopping one pump at a time while observing the termination criteria.

Operational Considerations:

Solid water operation is permissible only when reactor coolant system subcooling margin is <28°F. To throttle cold leg injection valves, the switch must be taken to the "MORE" position which places them in SIAS override.

EPG Step Content: (CEN-152, page 6-45, step 16)

If the SIS is operating, it may be throttled or stopped one train at a time if all of the following conditions are satisfied:

Justification of Differences:

The EPG step was divided into two steps, one covering termination criteria and the other covering termination direction. Specific direction to maintain pressurizer level is given since SIS is providing inventory control until SIAS and CIAS are reset; this allows letdown and charging to be placed back into normal service.

E. Recovery Actions

EOP Step 32 (continued).

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-2, Subcooling.

E. Recovery Actions

EOP Step Content:

Step 33. IF ALL Safety Injection termination criteria (step 31) can NOT be maintained after throttling OR stopping Safety Injection flow, THEN reinitiate Safety Injection flow.

Objective:

This step allows initiation of SIS flow should conditions warrant the need.

Basis: (CEN-152, page 6-18)

If any of the criteria of step 31 cannot be maintained, the safety injection pumps must be restarted whenever necessary to satisfy all the criteria.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-45, step 17)

If all the criteria of step 16 cannot be maintained after the SIS has been stopped, the SIS must be restarted.

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 34. Maintain Pressurizer temperature 10° to 20°F above isolated Steam Generator temperature

Objective:

This step ensures that pressurizer pressure is slightly above steam generator pressure to minimize leakage through the affected steam generator.

Basis: (CEN-152, page 6-24, step 23)

The small differential pressure will minimize the loss of primary fluid to the secondary side which will help to minimize potential releases of radioactive effluents to the environment. Since pressurizer pressure is above steam generator pressure, this will preclude secondary fluid from diluting reactor coolant system.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. Due to the accuracy of the pressure transmitters, temperature difference is used to satisfy the objective of this step.

EPG Step Content: (CEN-152, page 6-46, step 23)

Decrease and then control RCS pressure slightly above the affected steam generator pressure and below (1000 psig) using the following methods (listed in order of preference). Throughout the event, including cool-down, maintain the RCS within acceptable Post-Accident Pressure/Temperature Limits of Figure 6-10.

Justification of Differences:

Training of operators will provide the plant specific methods to control pressurizer pressure.

E. Recovery Actions

EOP Step 34 (continued).

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-3, Temperature.

E. Recovery Actions

EOP Step Content:

Step 35. Within 30 minutes to 1 hour from the time SIAS occurred, terminate Emergency Boration as follows:

Objective:

This step terminates emergency boration after an SIAS.

Basis:

Suction of the charging pumps should be realigned within thirty minutes to one hour for operational considerations.

Operational Considerations:

Thirty minutes to one hour time frames ensures adequate shutdown margin.

EPG Step Content: (CEN-152, page 5-62, step 30)

(If the charging pumps are taking suction from a concentrated boron source, realign suction to the RWT or other suitable source witnin 1 hour after the start of the loss of coolant accident.)

Justification of Differences:

This EOP step was inserted for operational considerations to terminate Emergency Boration.

Source Document:

CEN-152, Section 5.0, Loss of Coolant Accident Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 36. Reset SIAS AND CIAS. Refer to Attachment 7: SIAS and CIAS Reset Procedure.

Objective:

The objective of this step is to ensure that automatic actuation of SIAS and CIAS is available.

Basis: (CEN-152, page 6-29, step 35)

Because component statuses are changed in this procedure, as the cooldown progresses, automatic engineered safeguards protection shall remain available until the reactor coolant system is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-48, step 35)

If plant conditions permit, bypass automatic initiation of (MSIS, CIAS, CSAS, and SIAS by lowering the setpoint as the cooldown and depressurization proceeds).

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 37. Restore normal Charging AND Letdown to maintain Pressurizer level as follows:

Objective:

The objective of this step is to restore normal pressurizer level control.

Basis: (CEN-152, page 6-29, step 34)

The preferred means of controlling pressurizer level is by the chemical and volume control system. To exit this procedure under stable plant conditions and enter the plant operating procedure at a point where it will take over control of the plant, certain steps must be performed which would ensure that the plant controlling systems are in proper alignment.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 6-48, step 34)

Once pressurizer level has been restored, it should be maintained in the indicating range, between (35" and 245") (unless it is necessary to go solid to restore RCS subcooling) by the following methods (listed in order of preference):

Justification of Differences:

The portion of the EPG step concerning solid operation (if necessary for maintaining reactor coolant system subcooling) is addressed in a caution for EOP Step 26.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.
OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 38. Verify Shutdown Margin in accordance with Technical Specifications. Refer to OP-903-090, SHUTDOWN MARGIN.

Objective:

The objective of this step is to verify the shutdown margin conforms to the Technical Specification.

Basis: (CEN-152, page 6-23, step 22)

Due to the cooldown of the plant in the remainder of this procedure, the shutdown margin for reactor coolant system shall be determined in accordance with Technical Specification requirements.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-46, step 22)

Sample the RCS for radioactivity and boron concentration. Calculate and add sufficient boron to the RCS to raise the entire RCS (including the mass in the pressurizer) to the shutdown margin required by Technical Specifications.

Justification of Differences:

The sampling of the reactor coolant system was performed in a previous EOP step.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline; OP-903-090, Shutdown Margin.

E. Recovery Actions

EOP Step Content:

Step 39. Maintain isolated Steam Generator level 60% to 92% wide range as follows:

Objective:

The objective of this step is to ensure that the isolated steam generator level is maintained 60% to 92% wide range.

Basis: (CEN-152, page 6-21, step 19)

By ensuring the isolated steam generator level is being controlled, overfilling should be prevented. If overfilled, then the steam generator steam space and the main steam piping to the MSIV filling could present additional problems. Through use of the blowdown system as the preferred means, the spread of contamination is minimized. If the blowdown system is not available, then steaming the affected steam generator will minimize radioactive release through the steam generator safeties. The minimum level ensures that the steam generator tubes are covered with water.

Operational Considerations

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 6-45, step 19)

Prevent overfilling of the affected steam generator through periodic draining to the (radioactive waste system) or, if draining is not possible, dump steam from the steam generator to the condenser.

Justification of Differences:

The EOP step also ensures a steam generator level so that the steam generator tubes are covered.

E. Recovery Actions

EOP Step 39 (continued).

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level.

E. Recovery Actions

EOP Step Content:

Step 40. Maintain level in the Steam Generator which is NOT isolated as follows:

Objective:

The objective of this step is to ensure that the steam generator level is maintained in the operable steam generator.

Basis: (CEN-152, page 6-14, step 15)

When the steam generators are being used for heat removal from the reactor coolant system, main or emergency feedwater has to be supplied to the steam generator to ensure a heat sink.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 6-44, step 15)

If all RCPs have been stopped, inventory and pressure are being controlled, and the steam generators are geing used for heat removal, natural circulation flow is maintained in at least one loop. All of the following criteria must be met to demonstrate adequate natural circulation flow:

Justification of Differences:

This EPG step is divided into several EOP steps. The EOP step is concerned with both natural circulation and forced circulation.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 41. Start Auxiliary Boiler. Refer to OP-5-001, AUXILIARY BOILER, Section 6.3.

Objective:

The objective of this step is to start the auxiliary boiler to supply steam loads, and to permit removal of steam loads from the steam generators.

Basis:

To exit this problem under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must be performed; the steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 42. Transfer Gland Sealing Steam to Auxiliary Boiler as follows:

Objective:

The objective of this step is to transfer the steam load of gland sealing steam to the auxiliary boiler to remove steam loads from the steam generators.

Basis:

To exit this problem under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must be performed; the steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 43. IF Main Feed Pump is operating, THEN align it to the Auxiliary Boiler as follows:

Objective:

The objective of this step is to transfer the steam load of the main feed pump to the auxiliary boiler to permit removal of loads from the steam generators.

Basis:

To exit this problem under stable plant conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must be performed; the steps that must be performed would normally be completed by the Plant Operating Procedure prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 44. IF ALL Reactor Coolant Pumps have been stopped, THEN check the following Reactor Coolant Pump restart criteria:

Objective:

The objective of this step is to ensure the reactor coolant system employs the preferred means of coolant circulation.

Basis: (CEN-152, page 6-27, step 27)

A forced circulation cooldown is preferred to a natural circulation cooldown whenever possible during a recovery from a steam generator tube rupture. During forced circulation, there will be sufficient heat transfer to maintain the isolated steam generator temperature at the same relative temperature as the operating reactor coolant system loop. If the isolated steam generator temperature is not reduced, then voiding of large portions of the isolated loop could occur. This voiding could cause the steam generator to act as a pressurizer and delay depressurization.

Operational Considerations:

If component cooling water to reactor coolant pumps has been lost for ≥10 minutes, then reactor coolant pumps should not be restarted. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-47, step 27)

If and when conditions permit, restart one RCP in each loop to establish cooling of the isolated steam generator and continue RCS cooldown to SDC initiation conditions. Refer to step 14 for restart criteria. If RCP restart criteria are not met, go to step 31.

Justification of Differences:

This EPG step was divided into three different EOP steps so that plant specific instructions could be given.

E. Recovery Actions

EOP Step 44 (continued).

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level and Table 5-2, Subcooling.

E. Recovery Actions

EOP Step Content:

Step 45. IF ALL Reactor Coolant Pump restart criteria (step 44) are satisfied, THEN restart one Reactor Coolant Pump in each loop. Refer to OP-1-002, REACTOR COOLANT PUMP OPERATION, Section 4.0 and 6.1.

Objective:

The objective of this step is to ensure the reactor coolant system employs the preferred means of coolant circulation.

Basis:

If forced circulation is possible by starting reactor coolant pumps, then only one reactor coolant pump in each loop should be operated in an effort to minimize heat input to the reactor coolant system.

Operational Considerations:

If component cooling water to reactor coolant pumps has been lost for ≥10 minutes, then reactor coolant pumps should not be restarted.

EPG Step Content: (CEN-152, page 6-47, step 27)

If and when conditions permit, restart one RCP in each loop to establish cooling of the isolated steam generator and continue RCS cooldown to SDC initiation conditions. Refer to step 14 for restart criteria. If RCP restart criteria are not met, go to step 31.

Justification of Differences:

This EPG step was divided into three different EOP steps so that plant specific instructions could be given.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 46. IF Reactor Coolant Pumps are operating, THEN verify Spray Valves selector switch is selected to the loop with the operating Reactor Coolant Pump.

Objective:

The objective of this step is to verify that normal spray is available.

Basis:

With forced circulation of coolant through the core, this action ensures that the normal mode of pressurizer spray is available.

Operational Considerations:

If the pressurizer auxiliary spray was being used, then charging shall be returned to normal lineup. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper positions.

EPG Step Content: (CEN-152, page 6-51, Precautions, 11)

If restarting reactor coolant pumps, consideration shall be given to choosing pump combinations which will maximize pressurizer spray flow.

Justification of Differences:

This EPG precaution was made a step in the EOP to make it a positive aciton and thereby ensure that normal spray is utilized.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 47. IF Reactor Coolant Pumps are operating, THEN go to step 59.

Objective:

The objective of this step is to ensure the preferred method of cooldown is used if the reactor coolant pumps are available.

Basis:

When the reactor coolant pumps are operating, then this step directs the operator to step 59 to perform a forced circulation cooldown. Natural circulation is not as efficient as forced circulation for cooling the isolated steam generator; therefore, if possible, utilize the forced circulation cooldown.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-47, step 31)

If necessary, a natural circulation cooldown is performed by the steps in the remainder of the guideline.

Justification of Differences:

In the EOP, the natural circulation cooldown is placed first in the procedure to place emphasis on natural circulation since system logic indicates that it will most probably be used.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideli

E. Recovery Actions

EOP Step Content:

Step 48. Check AND continuously monitor Natural Circulation by ALL the following:

Objective:

The objective of this step is to check the conditions that indicate natural circulation flow exists.

Basis: (CEN-152, page 6-14, step 15)

During cooldown and depressurization to shutdown cooling initiating conditions, indications of natural circulation have to be verified. When single phase circulation is established in at least one loop, the RCS indicates all of the following:

a) Loop ΔT (T_H-T_C) less than full power ΔT

b) Cold leg temperatures constant or dropping

c) Hot leg temperatures stable (i.e., not steadily rising) or dropping

d) No abnormal differences between T_H RTDs and core exit thermocouples. Hot leg RTD temperature should be consistent with the core exit thermocouples. Adequate natural circulation flow ensures that core exit thermocouples temperatures will be approximately equal to the hot leg RTDs temperature within the bounds of the instrument's inaccuracies. An abnormal difference between T_H and the CETs is greater than (10)°F.

If all RCP operation is terminated, and when inventory and pressure are controlled, then natural circulation is monitored by heat removal via at least one steam generator.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

E. Recovery Actions

EOP Step 48 (continued).

EPG Step Content: (CEN-152, page 6-48, step 32)

If all RCPs have been stopped, inventory and pressure are being controlled, and the steam generators are being used for heat removal, natural circulation flow is maintained in at least one loop. All of the following criteria must be met to demonstrate adequate natural circulation flow:

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameter Values Document. Table 5-1, Level and Table 5-3, Temperature.

E. Recovery Actions

EOP Step Content:

Step 49. When a Steam Generator Low Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

The objective of this step is to prevent a main steam isolation signal from occurring and inhibiting cooldown.

Basis: (CEN-152, page 6-29, step 35)

During a controlled cooldown and depressurization the automatic operation of certain safeguard systems is undesirable. Therefore, the setpoint of MSIS must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-48, step 35)

If plant conditions permit, bypass automatic initiation of (MSIS, CIAS, CSAS and SIAS by lowering the setpoint as the cooldown and depressurization proceeds).

Justification of Differences:

This step was divided since MSIS applies to cooldown of RCS, while CIAS and SIAS apply to depressurization of RCS.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 50. Determine the optimum ΔT to be maintained between Steam Generators during cooldown as indicated on STEAM GENERATOR OUTLET TEMP (MS-ITR-301 A/B) recorder. Refer to Attachement 8: Steam Generators Optimum ΔT Curve.

Objective:

The objective of this step is to provide the temperature difference allowed between steam generators when utilizing circulation for cooldown of the reactor coolant system.

Basis:

Natural circulation will occur in the isolated steam generator even if its temperature is slightly above reactor hot leg temperature. As the ΔT increases, more heat is transferred to the primary coolant in the isolated steam generator, but natural circulation flow decreases. The optimum ΔT between steam generators to achieve maximum heat transfer is given in Attachment 8. Maintain this ΔT by bleeding steam from the steam generator not isolated, and cooling the isolated steam generator as per step 51.

Justification of Differences:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

FSAR, question 211-94.

E. Recovery Actions

EOP Step Content:

Step 51. IF the Control Room Supervisor determines that cooldown of the isolated Steam Generator is required, THEN feed AND drain as follows:

Objective:

This step ensures that the isolated steam generator is cooled down while the reactor coolant system is being cooled down.

Basis: (CEN-152, page 6-30, step 37)

With no reactor coolant pumps operating, there usually will be little flow through the isolated steam generator, which would limit the plant cooldown rate. The isolated steam generator may be cooled, if necessary, to accelerate plant cooldown.

Operational Consideraticns:

If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 6-49, step 37)

During the cooldown remove heat from the isolated S/G by one of the following methods (listed in order of priority):

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 52. Commence Plant cooldown to obtain Cold Leg temperature of 350°F for the loop with the Steam Generator which is NOT isolated AND maintain optimum ΔT as follows:

Objective:

This step provides methods to continue the cooldown of the reactor coolant system to the shutdown coolant initiation conditions.

Basis:

An orderly cooldown and depressurization is resumed with the steam generator not isolated. These methods are presented in order, with the most preferred method listed first, to minimize radiological releases.

Operational Considerations:

Limit cooldown rate for reactor coolant system $\leq$50°F/hr. and for pressurizer $\leq$100°F/hr. If maintaining the optimum ΔT slows down the cooldown rate of the isolated steam generator, then maintain a slightly lower ΔT. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 6-47, step 24)

Resume an orderly reactor plant cooldown in accordance with Technical Specification limits with forced circulation (preferred) or natural circulation by conducting one of the following activities:

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 53. At the following time intervals, determine the optimum ΔT. Refer to Attachment 8: Steam Generators Optimum ΔT Curve.

Objective:

This step determines the amount of decay power remaining for the time after reactor trip.

Basis:

As time elapses, the amount of decay power remaining shall be determined. This decay power is used to determine the optimum ΔT between the steam generators in the following step so that the maximum heat transfer to the RCS can be maintained.

Operational Considerations:

Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

FSAR, question 211-94.

E. Recovery Actions

EOP Step Content:

Step 54. When a Low Pressurizer Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

This step prevents a containment isolation or safety injection actuation signal from occurring.

Basis: (CEN-152, page 6-29)

During a controlled cooldown and depressurization, the automatic operation of certain safeguard systems is undesirable. Therefore, the setpoint of CIAS and SIAS must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-48, step 35)

If plant conditions permit, bypass automatic initiation of (MSIS, CIAS, CSAS and SIAS by lowering the setpoint as the cooldown and depressurization proceeds.

Justification of Differences:

This step was divided up since MSIS applies to cooldown of RCS, while CIAS and SIAS apply to depressurization of RCS.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 55. Commence Plant depressurization to 375 psia using Pressurizer Auxiliary Spray.

Objective:

The objective of this step is to depressurize the reactor coolant system to shutdown cooling entry conditions.

Basis:

To exit this procedure under stable plant conditions and enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must be performed. The steps that must be performed would normall, be completed by the Plant Operating Procedure at a point prior to the point of entry from this procedure.

Operational Considerations:

During cooldown and depressurization, maintain subcooling margin 28°F to 200°F. Refer to Attachment 9: Post-Accident Pressure and Temperature Limit Graph.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 56. During Plant depressurization, monitor for Reactor Coolant System voiding as indicated by:

Objective:

This step provides guidance for detecting voids in the reactor coolant system.

Basis: (CEN-152, page 6-21, step 20)

Since there are certain reactor coolant system conditions for which the presence of voids is acceptable, then voids are not a problem as long as the core and reactor coolant system heat removal and the reactor coolant system inventory safety functions are being satisfied. If these safety functions are not being satisfied or voiding is causing the reactor coolant system to remain pressurized above the shutdown cooling entry conditions, then this step will indicate voids. If voids are indicated, then step 52 will be performed.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-46, step 20)

Monitor for RCS voiding. Indications of voiding are any of the following parameter changes or trends:

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 57. IF Reactor Coolant System voiding is indicated, THEN perform the following:

Objective:

This step provides methods to eliminate voids of the reactor coolant system.

Basis: (CEN-152, page 6-23, step 21)

IF voiding was indicated in the previous step, THEN eliminate the voids if either of the following exists:

1. The following safety functions are NOT being satisfied:
   a. Core heat removal
   b. Reactor coolant system heat removal
   c. Reactor coolant system inventory

   OR

2. The Reactor coolant system remains pressurized above shutdown cooling entry conditions because of reactor coolant system voids present.

Operational Considerations:

If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper positions. Where multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-46, step 21)

Void elimination is performed as follows:

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 58. IF ALL required actions of Natural Circulation cooldown (steps 48-57) were completed, THEN go to step 65.

Objective:

This step ensures that the operator continues this procedure to the shutdown cooling entry conditions.

Basis:

This step directs the operator to bypass the portion of this procedure which pertains to forced circulation cooldown. The remainder of this procedure would then be utilized to ensure that the shutdown cooling entry conditions are satisfied.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 59. IF ALL Reactor Coolant Pumps are operating, THEN stop Reactor Coolant Pump 2A AND 1A as follows:

Objective:

The objective of this step is to secure one reactor coolant pump in each loop to reduce RCS heat input.

Basis:

To exit this procedure under stable conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure at a point prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations..

E. Recovery Actions

EOP Step Content:

Step 60. Verify SPRAY VALVES selector switch is selected to "LOOP 1B."

Objective:

The objective of this step is to verify that normal spray is available.

Basis: (CEN-152, page 6-13, step 14)

With forced circulation of coolant through the core, this action ensures that the normal mode of pressurizer spray is available.

Operational Considerations:

If the pressurizer auxiliary spray was being used, then charging shall be returned to normal lineup. If the automatic function is not operating properly, then the system should be placed in manual. Systems in manual should be monitored for proper operation.

EPG Step Content: (CEN-152, page 6-51, precaution 11)

If restarting reactor coolant pumps, consideration should be given to choosing pump combinations which will maximize pressurizer spray flow.

Justification of Differences:

This EPG precaution was made a step in the EOP to make it a positive action to ensure normal spray is utilized.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 61. When a Steam Generator Low Pressure Pretrip alarm occurs, reset the setpoint.

Objective:

This step prevents a main steam isolation signal from occuring and inhibiting cooldown.

Basis: (CEN-152, page 6-29)

During a controlled cooldown and depressurization, the automatic operation of certain safeguard systems is undesirable. Therefore, the setpoint of MSIS must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-48)

Step 35. If plant conditions permit, bypass automatic initiation of (MSIS, CIAS, CSAS and SIAS by lowering the setpoint as the cooldown and depressurization proceeds).

Justification of Differences:

This step was divided up since MSIS applies to cooldown of RCS, while CIAS and SIAS apply to depressurization of RCS.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 62. Commence Plant cooldown to obtain Cold Leg temperature of 350°F for the loop with the Steam Generator which is NOT isolated by one of the following:

Objective:

The objective of this step is to cool down the plant to shutdown cooling entry conditions.

Basis: (CEN-152, page 6-26)

An orderly cooldown and depressurization is resumed with the undamaged (or least damaged) steam generator by preferentially using the main or emergency feedwater systems in conjunction with the turbine bypass system.

Operational Considerations:

Limit cooldown rate for reactor coolant system ≤100°F/hr. and for pressurizer ≤200°F/hr.

EPG Step Content: (CEN-152, page 6-47, step 24)

Resume an orderly reactor plant cooldown in accordance with Technical Specification limits with forced circulation (preferred) or natural circulation by conducting one of the following activities:

Justification of Differences:

The EOP step specifies a target value so the operator knows the cooldown end point.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 63. When a Low Pressurizer Pressure Pretrip alarm occurs, reset the setpoint:

Objective:

The objective of this step is to prevent a containment isolation or safety injection from occurring.

Basis: (CEN-152, page 6-29)

During a controlled cooldown and depressurization, the automatic operation of certain safeguard systems is undesirable. Therefore, the setpoint of CIAS and SIAS must be manually reset (lowered) as the cooldown progresses to ensure that automatic engineered safeguards protection remains available until the RCS is cooled down and depressurized.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-48, step 35)

If plant conditions permit, bypass automatic initiation of (MSIS, CIAS, CSAS and SIAS by lowering the setpoint as the cooldown and depressurization proceeds).

Justification of Differences:

This step was divided up since MSIS applies to cooldown of RCS, while CIAS and SIAS apply to depressurization of RCS.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 64. Commence Plant depressurization to 375 psia using Normal Spray.

Objective:

The objective of this step is to depressurize the RCS to shutdown cooling entry conditions.

Basis:

To exit this procedure under stable conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure at a point prior to the point of entry from this procedure.

Operational Considerations:

During cooldown and depressurization, maintain subcooling margin 28°F to 200°F. Refer to Attachment 9: Post-Accident Pressure and Temperature Limit Graph. When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 65. Evaluate Condensate Storage Pool inventory. Refer to Attachment 10: Feedwater Capacity versus Time remaining at Hot Standby AND Attachment 11: Feedwater Required for a Cooldown to Tc (Required) versus Tc (Initial).

Objective:

The Control Room Supervisor determines the amount of water necessary for cooldown and time remaining before cooldown must begin.

Basis: (CEN-152, page 6-28, step 33)

The available condensate inventory should be continually monitored, and replenished from available sources as necessary to provide a source for a secondary heat sink. This action is performed when either main feedwater or emergency feedwater is used for the cooldown. The operator will monitor required tank levels with the Plant Data Book.

Operational Considerations:

Without main feedwater, cooldown to shutdown cooling entry conditions must begin as soon as possible to ensure adequate inventory in the condensate storage pool to avoid usage of auxiliary component cooling water.

EPG Step Content: (CEN-152, page 6-48, step 33)

During the cooldown, continually monitor the condensate inventory to ensure an adequate supply. Refer to Figures 6-12 and 6-13.

Justification of Differences:

NA

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.
Plant Data Book.

E. Recovery Actions

EOP Step Content:

Step 66. IF using Main Feedwater to feed Steam Generators AND Cold Leg temperature is ≤450°F for the loop with the Steam Generator which is NOT isolated, THEN perform the following:

Objective:

This step secures main feed and aligns the condensate system to feed the steam generators.

Basis:

To exit this procedure under stable conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure at a point prior to the point of entry from this procedure.

Operational Considerations:

NA

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 67. IF EFAS-1 is actuated AND Condensate system is feeding Steam Generator 1, THEN perform the following:

Objective:

This step secures Emergency Feedwater to Steam Generator 1 and aligns the associated Emergency Feedwater valves in a standby alignment.

Basis:

With Condensate feeding Steam Generator 1, EFAS-1 may be reset and the Emergency Feedwater valves for Steam Generator 1 placed in a standby alignment.

Operational Considerations:

N/A

EPG Step Content:

N/A

Justification of Differences:

NA

Source Document:

OP-9-0C3, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 68. IF EFAS-2 is actuated AND Condensate system is feeding Steam Generator 2, THEN perform the following:

Objective:

This step secures Emergency Feedwater to Steam Generator 2 and aligns the associated Emergency Feedwater valves in a standby alignment.

Basis:

With Condensate feeding Steam Generator 2, EFAS-2 may be reset and the Emergency Feedwater valves for Steam Generator 2 placed in a standby alignment.

Operational Considerations:

N/A

EPG Step Content:

N/A

Justification of Differences:

NA

Source Document:

OP-9-003, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 69. IF EFAS-1 AND EFAS-2 have been reset AND Condensate system is feeding BOTH Steam Generators, THEN stop Emergency Feedwater pumps as follows:

Objective:

This step secures Emergency Feedwater pumps which are not necessary.

Basis:

With EFAS-1 and EFAS-2 reset and Condensate system supplying both Steam Generators, there is not a need to have Emergency Feedwater operating and the pumps may be restored to a standby alignment.

Operational Considerations:

N/A

EPG Step Content:

N/A

Justification of Differences:

NA

Source Document:

OP-9-003, Emergency Feedwater, Section 6.4.

E. Recovery Actions

EOP Step Content:

Step 70. IF using Emergency Feedwater to feed Steam Generators, THEN perform the following:

Objective:

This step ensures continuous suction supply to emergency feed pumps.

Basis: (CEN-152, page 6-28)

The available condensate inventory should be continually monitored and replenished from available sources as necessary to provide a source for a secondary heat sink.

Operational Considerations:

Obtain permission from control room supervisor prior to aligning auxiliary component cooling system to the emergency feedwater system.

EPG Step Content: (CEN-152, page 6-48, step 33)

During the cooldown, continually monitor the condensate inventory to ensure an adequate supply. Refer to Figures 6-12 and 6-13.

Justification of Differences:

The EOP step was written just for Emergency Feed since that is the system which will be used if condensate inventory is a problem. The step also was expanded to include setpoints.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline. Technical Guideline, Section 5.10, Parameters Value Document. Table 5-1, Level.

E. Recovery Actions

EOP Step Content:

Step 71. When Pressurizer pressure is lowered to 650 psia, lower Safety Injection Tank pressure to between 300 psig AND 235 psig by operating the following SAFETY INJECTION TANKS vent valves:

Objective:

This step reduces safety injection tank pressure to prevent dumping tanks into the reactor coolant system.

Basis:

To exit this procedure under stable conditions and then enter the Plant Operating Procedure at a point where it will take over control of the plant, certain steps must be performed. The steps that must be performed would normally be completed by the Plant Operating Procedure at a point prior to the point of entry from this procedure.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

E. Recovery Actions

EOP Step Content:

Step 72. When Pressurizer pressure is <400 psia, place the RPS/ESFAS PZR PRESS BYPASS switch to "BYPASS" on ALL four channels of Plant Protection System.

Objective:

This step prevents SIAS and CIAS below minimum reset setpoint for low pressurizer pressure.

Basis: (CEN-152, page 6-29)

During cooldown and depressurization, the automatic operation of certain safeguard systems is undesirable.

Operational Considerations:

NA

EPG Step Content: (CEN-152, page 6-48, step 35)

If plant conditions permit, bypass automatic initiation of (MSIS, CIAS, CSAS and SIAS by lowering the setpoint as the cooldown and depressurization proceeds).

Justification of Differences:

The EOP step was expanded to include the setpoint.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 73. When Pressurizer pressure is between 392 psia AND 350 psia, perform the following:

Objective:

This step isolates the safety injection tanks.

Basis: (CEN-152, page 6-28)

The safety injection tanks should be isolated, vented, and drained at 250 psig to avoid introducing their nitrogen cover gas into the RCS and increasing the severity of the event.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-47, step 29)

(Isolate, vent, or drain the safety injection tanks at 250 psia.)

Justification of Differences:

The EOP step isolates SITs between 392 psia and 350 psia so isolation is done [illegible] to shutdown cooling entry.

Source Docum[illegible]

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 74. When the following conditions are established, maintain them as follows:

Objective:

This step establishes and maintains shutdown cooling entry conditions to provide a smooth transition into General Plant Operating Procedure.

Basis: (CEN-152, page 6-28)

This activity places the plant in an operational mode where a complete cooldown and depressurization of the plant can take place.

Operational Considerations:

When multiple indications for one parameter exist, use more than one instrument to obtain a particular reading.

EPG Step Content: (CEN-152, page 6-47, step 28)

When the RCS is cooled to (300°F) and depressured to (300 psia), initiate shutdown cooling per the SCS operating instructions

Justification of Differences:

The EOP step was written just to stabilize the RCS at SDC entry conditions and then "kick out" to General Plant Operating Procedure to initiate SDC. The EOP step also includes the plant specific numbers for SDC entry conditions.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 75. Record Pressurizer Spray Cycles.

Objective:

This step documents the number of spray cycles.

Basis: (Technical Specification 5.7)

The components identified in Table 5.7-1 are designed and shall be maintained within the cycle or transient limits of Table 5.7-1.

Operational Considerations:

The number of cycles is determined by comparing the Pressurizer pressure recorder to the time frame of the event.

EPG Step Content: (CEN-152, page 6-51, precaution 10)

Minimize the number of cycles of pressurizer auxiliary spray whenever the temperature differential between the spray water and the pressurizer is greater than (200°F) in order to minimize the increase in the spray nozzle thermal stress accumulation factor. Every such cycle must be recorded in accordance with Technical Specification limitations.

Justification of Differences:

The EPG precaution was made a step to ensure positive action by the operator.

Source Document:

CEN-152, Section 6.0, Steam Generator Tube Rupture Recovery Guideline.

E. Recovery Actions

EOP Step Content:

Step 76. Go to OP-10-001, GENERAL PLANT OPERATIONS, Section 6.9 AND continue cooldown as directed by the Control Room Supervisor.

Objective:

The objective of this step is to exit the emergency procedures and enter normal plant operating procedures.

Basis:

This step allows operational personnel to continue operating or cooldown further in accordance with normal operating procedures rather than emergency procedures. This also serves to limit the length of emergency procedures.

Operational Considerations:

Line up shutdown cooling to the loop with the steam generator which is not isolated.

EPG Step Content:

NA

Justification of Differences:

NA

Source Document:

OP-10-001, General Plant Operations.

5.8.2 Guidelines for Safety Function Status Checklist

Safety Functions	Criteria	Bases
Reactivity Control	a. Reactor power dropping OR $<10^{-4}\%$ b. Negative SUR c. <10 CEAs NOT fully inserted d. For any CEA NOT fully inserted, Emergency Boration in progress OR has occurred.	(CEN-152, page 5-43) For all emergency events, the reactor must be shutdown. The criterion of <10 CEAs NOT fully inserted is based on ATWS. The criterion that all CEAs fully inserted or emergency boration is in progess observes technical specification limits.
RCS Inventory Control	a. Pressurizer Level between 33% AND 60% b. RCS ≥28°F subcooled OR c. At least one Charging Pump operating with >40 gpm flow d. At least one HPSI Pump operating with Cold Leg Injection valves open: 1) Train A Cold Leg Injection Valves (SI 225A, SI 226A, SI 227A, SI 228A) 2) Train B Cold Leg Injection Valves (SI 225B, SI 226B, SI 227B, SI 228B).	(CEN-152, page 7-22) A value of 60% was chosen as an upper limit to protect water from reaching the safeties and to account for instrument inaccuracies. A value of 33% was chosen as a lower limit since this is the no-load value for pressurizer level. A 28°F subcooling margin co-existing with a pressurizer level between 30% to 60% indicates adequate RCS inventory control via a saturated bubble in the pressurizer. (CEN-152, page 5-44) For cases where RCS inventory is badly degraded, the ECC operation provides assurance that control is being regained.

5.8.2 Guidelines for Safety Function Status Checklist

Safety Functions	Criteria	Bases
RCS Pressure Control	a. Pressurizer Pressure Control System functioning to maintain OR restore Pressurizer pressure. OR b. At least one charging pump operating with $\geq$40 gpm flow. c. At least one HPSI Pump operating with Cold Leg Injection vlaves open. 1) Train A cold leg injection valves (SI 225A, SI 226A, SI 227A, SI 228A) 2) Train B cold leg injection valves (SI 225B, SI 226B, SI 227B, SI 228B).	The range of the selected events are very broad, therefore the acceptance criteria is written to cover the the expected range which may result from the events noted.

5.8.2 Guidelines for Safety Function Status Checklist

Safety Functions	Criteria	Bases
RCS AND Core Heat Removal	a. CET temperatures satisfying BOTH of the following: 1) <800°F 2) NOT steadily rising for more than 15 minutes b. At least one Steam Generator is satisfying either: 1) Level is BOTH: a) >50% Wide Range b) Constant OR rising OR 2) Level is being restored by either Main OR Emergency Feedwater c. T_C ≤550°F. d. RCS ≥28°F subcooled	(CEN-152, pages 6-34, 6-35) Since the Saturation Temperature corresponding to the RCS safety setpoints is less than 700°F, 800°F represents a superheat condition at high pressure in the RCS which can only occur with core uncovery. Core uncovery results from a loss of RCS inventory. While 800°F bounds all anticipated events, loss of Main Feedwater should result in no core uncovery and, therefore, no indicated superheat on the CETs. 800°F is a plant-specific temperature based on engineering judgement. Best estimate analysis have shown that 800°F CET temperature will not generally be exceeded without multiple equipment failures or coincident other accidents. The acceptance criteria that CET temperature not show an increasing trend for more than 15 minutes is based on analysis. CET temperature less than 800°F can result in significant fuel clad oxidation over extended time periods, i.e., 15 minutes. An increasing trend for a short period of time is possible and acceptable. (CEN-152, page 5-48) Decay heat levels may not be high enough to require feedwater flow of 150 gpm. If this is the case, one steam generator level is returned to the zero power level band and feedwater remains available to maintain that level, then the S/G contribution to RCS heat removal is being satisfied. 550°F is based on control program for ADVs and steam generator dump bypass valves and best estimate analysis.

5.8.2 Guidelines for Safety Function Status Checklist

Safety Functions	Criteria	Bases
Containment Temperature AND Pressure Control	a. Containment pressure <17.4 psia AND NO CSAS.	17.4 psia is based on high containment pressure setpoint. It is not expected for selected events that containment pressure will increase to the setpoint.
Containment Isolation	a. No containment area radiation monitors alarming.	No radiation is anticipated in the containment for a steam generator tube rupture.
Containment Combustible Gas Control	a. Hydrogen concentration <0.5%	Hydrogen concentration in the containment should not rise for a steam generator tube rupture.
Vital Auxiliaries	a. BOTH of the following exist: 1) A AND B 6.9 KV busses energized 2) A AND B 4.16 KV non-safety busses energized b. A AND B 4.16 KV safety busses energized.	Having both A and B trains of non-safety busses energized ensures that all required auxiliaries are available and that the operator remains within the bounds of the Loss of Main Feedwater procedure which does not include degraded electrical distribution system.

5.8.3 Generic Steps Not Included In The Waterford-3 EOP

In the items cited below, the step, precaution, and page numbers refer to the appropriate sections of CEN-152.

E. Recovery Actions

Step 4 (page 6-42):

If the initial diagnosis of a SGTR is confirmed by the Break Identification Chart (Figure 7-4) and the status of the safety functions is assured by using the Safety Functions Status Checklist (Figure 7-5), then continue with the actions of this guideline. If not, implement the Function Recovery Guideline.

Justification:

This step was not used since it is redundant with respect to subsequent steps which instruct the operator to monitor safety functions by using the Safety Function Status Checklist and, if any safety function is not being satisfied, to go to the Safety Function Recovery Procedure.

E. Recovery Actions

Step 15 (page 6-45, second part of step):

If all RCPs have been stopped and inventory and pressure are not being controlled, two phase natural circulation cooling along with break heat removal maintain the heat removal process. In this mode the operator performs the following:

Justification:

This part of the step was not used since two phase flow has been addressed in the Safety Function Recovery Procedure. If inadequate subcooling is indicated, then the operator will exit the SGTR procedure and go the Safety Function Recovery Procedures.

E. Recovery Actions

Step 18 (page 6-45):

If the SIS termination criteria are met and the isolated steam generator is still overfilling with primary fluid, stop the running HPSI pumps.

Justification:

This step was not used since the termination guidance is given to maintain pressurizer level at 33%. Also, guidance is given to maintain isolated steam generator level, using blowdown and/or steaming.

E. Recovery Actions

Step 26 (page 6-47):

Continually observe the turbine and auxiliary building ventilation systems radiation monitors and any other applicable radiation monitors. Take corrective actions, if necessary, in accordance with plant Technical Specifications Limitations.

Justification:

This step was not used since most of this action is covered by the Health Physics surveys. The Health Physics Department is directed to conduct radiation surveys which will involve observing local monitors as well as taking local samples.

E. Recovery Actions

Step 28 (page 6-47) and Step 38 (page 6-49):

When the RCS is cooled to 300°F and depressurized to 300 psia, initiate shutdown cooling per the SCS operating instructions.

Justification:

This step was not used since this procedure is exited, and normal plant operating procedures are begun, when shutdown cooling is put in service.

E. Recovery Actions

Step 30 (page 6-47) and Step 40 (page 6-49):

Initiate the low temperature overpressurization system at 275°F.

Justification:

This step was not used since this procedure is exited prior to cooldown to 275°F. When the reactor coolant system is aligned for shutdown cooling in OP-10-001, General Plant Operations, the low temperature overpressurization system will be initiated.

E. Recovery Actions

Precaution 5 (page 6-50):

If the faulted steam generator has been isolated and the cooldown is proceeding via natural circulation, an inverted ΔT (i.e., T_C greater then T_H greater than T_H) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated steam generator and will have no effect on natural circulation flow in the intact steam generator.

Justification:

This precaution was not used becaust it was decided that operators would be trained to recognize this inverted ΔT and its effect on cooldown.

E. Recovery Actions

Precaution 12 (page 6-51):

Monitor quench tank parameters since any sustained operation of the PORVs may burst the tank's rupture disc.

Justification:

This precaution was not used since Waterford-3 does not have PORVs.

E. Recovery Actions

Figure 6-11 (page 6-56):

Minimum Acceptable SIS Flow vs RCS Pressure.

Justification:

This curve was not used since inventory is restored within a short period during a SGTR. This curve is more applicable to LOCA.

5.8.4 List of Instruments and Ranges

Parameter and Ranges
for SGTR Procedure

Parameters	Required Range	Available Range
1. Pressurizer pressure	350 to 2250 psia	0 to 3000 psia
2. Pressurizer level	28 to 60%	0 to 100%
3. Pressurizer temperature	430 to 652°F	0 to 700°F
4. Average temperature	544 to 582°F	525 to 625°F
5. Cold leg temperature	350 to 550°F	0 to 600°F
6. Hot leg temperature	350 to 611°F	50 to 750°F
7. Core temperature	350 to 800°F	200 to 2300°F
8. Subcooling margin	20 to 200°F	-200 to 200°F
9. Volume control tank level	10 to 68%	0 to 100%
10. Charging header flow	40 to 132 gpm	0 to 150 gpm
11. Steam generator pressure	67 to 1050 psia	0 to 1200 psia
12. Steam generator level		
a. Wide range	52 to 85%	0 to 100%
b. Narrow range	60 to 70%	0 to 100%
13. Steam generator outlet temperature	300 to 572°F	0 to 600°F
14. Steam flow	0 to 7.5 x 10^6 lbm/hr	0 to 8.0 x 10^6 lbm/hr
15. Feed flow	0 to 7.5 x 10^6 lbm/hr	0 to 8.0 x 10^6 lbm/hr
16. Emergency feedwater flow	0 to 400 gpm	0 to 800 gpm
17. Condensate storage pool level	27.7 to 97.7%	0 to 100%
18. High pressure turbine gland sealing steam (local)	1.5 to 3 psig	0 to 15 psia
19. Low Pressure turbine sealing steam (local)	1.5 to 3 psig	-30 in Hg Vac to 15 psig
20. Main feed pump gland sealing steam (local)	4 psig	-30 in Hg Vac to 60 psig
21. Gland steam pressure	140 psig	0 to 150 psig
22. Containment pressure	0 to 17.4 psia	0 to 30 psia
23. Safety injection tank pressure	235 to 625 psig	0 to 700 psig

Parameters	Required Range	Available Range
24. High pressure safety injection		
a. Flow		0 to 500 gpm
b. Pressure		0 to 2500 psig
25. Low pressure safety injection		
a. Flow		0 to 5500 gpm
b. Pressure		0 to 650 psig
26. Steam generator blowdown activity monitor		10 to 10^6 cpm
27. Main steam line activity monitor		10^0 to 10^5mr/hr
28. Condenser vacuum pump exhaust activity monitor		10 to 19^7 cpm